Vol. XXIX DECEMBER 1935 Number 12

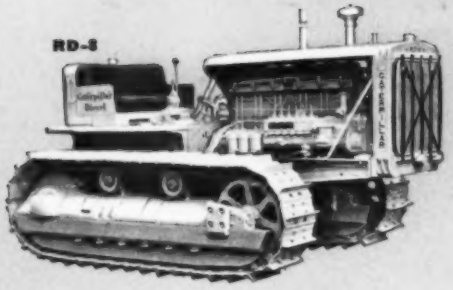
EXCAVATING ENGINEER

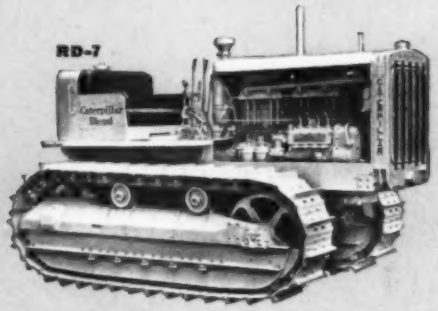
FOUNDED 1905

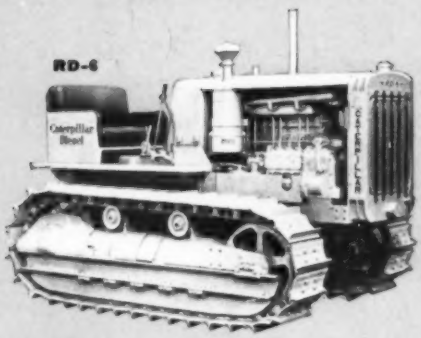
TRANSPORTATION LIBRARY

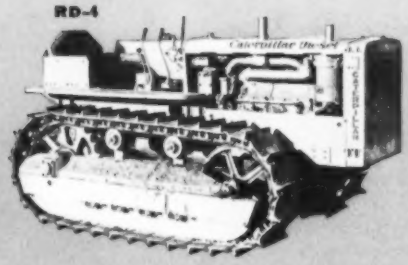
Two-truck spotting increased output on excavation for the power house on TVA's $23,000,000 Wheeler Dam.

FIRST IN POWER PERFORMANCE SAVINGS









Over 9000 "Caterpillar" Diesels are saving money for their users. . . . Now, new models offer more power, greater work-production, bigger savings than ever before. . . . New models, topped by the RD-8, biggest, most powerful tractor on the market today. . . . New models including a smaller size, RD-4 (deliveries begin in February, 1936) that extends "Caterpillar" Diesel advantages to new thousands of tractor users. . . . New prices, offering more usable horsepower per dollar of purchase price than ever before in tractor history. . . . Now is the time to replace your present obsolete power. . . . Let your "Caterpillar" dealer prove to you, by facts, figures, demonstration, that these new tractors are the biggest values in the power world today. . . . Get the SHOW-DOWN! Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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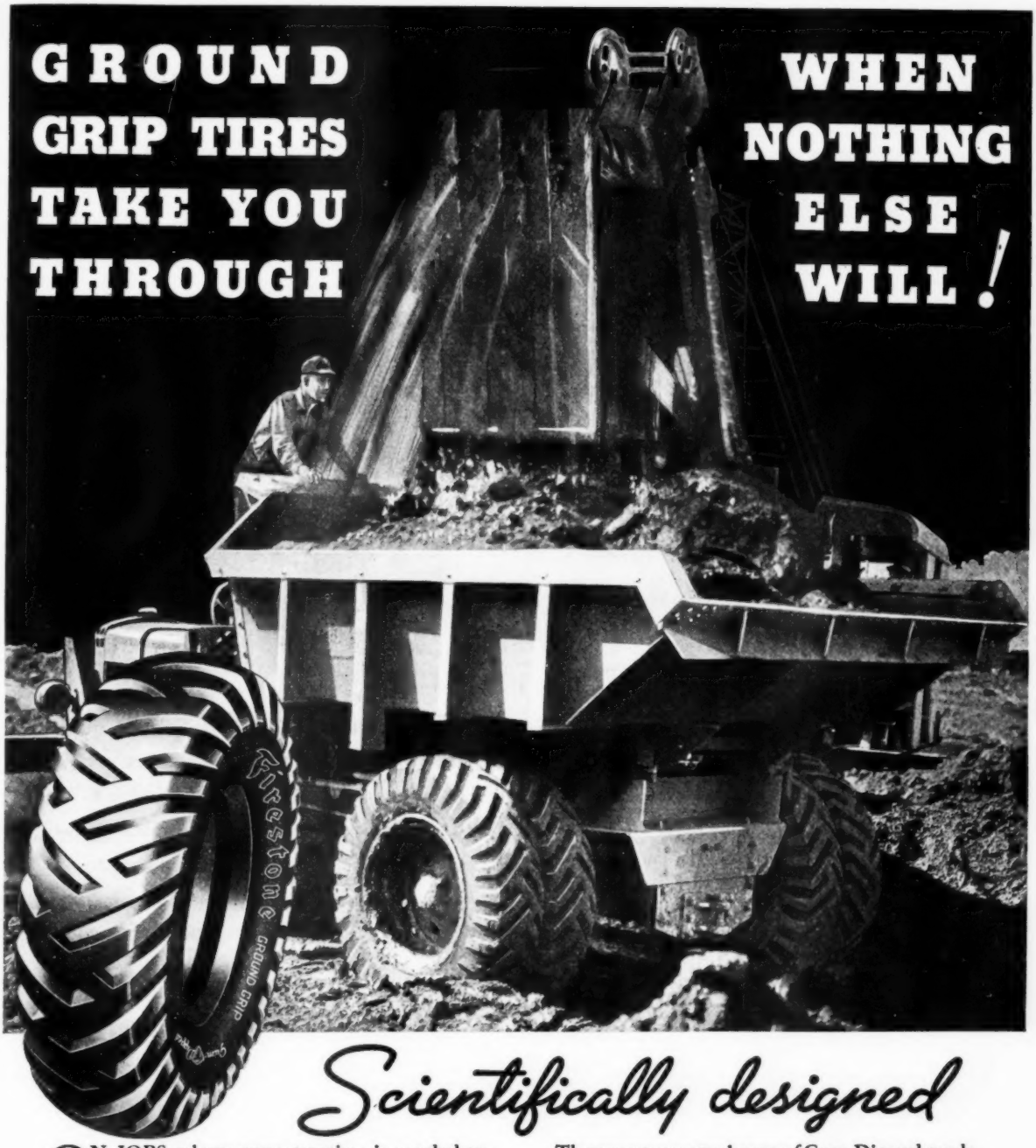

Scientifically designed

ON JOBS where super-traction is needed to pull through soft ground, loose earth, mud, sand or snow, Ground Grip Tires have no equal. The rugged, scientifically designed Ground Grip tread grips where other tires, even with chains, would leave you stranded.

The body of this remarkable tire is built with Gum-Dipped High Stretch cords, giving it super-strength to withstand the terrific strains under heavy loads.

There are two extra layers of Gum-Dipped cords between the tread and body, permanently locking them together. These are patented Firestone construction features not used in any other tire.

Equip your trucks with Firestone Ground Grip Tires—you will save more time and do more work at lower operating cost. Specify Firestone Ground Grip Tires on your new equipment. The nearby Firestone Auto Supply and Service Store or Firestone Tire Dealer is ready to serve you.

• • •

Listen to the Voice of Firestone featuring Richard Crooks or Nelson Eddy—with Margaret Speaks, Monday evenings over Nationwide N. B. C.—WEAF Network

Firestone

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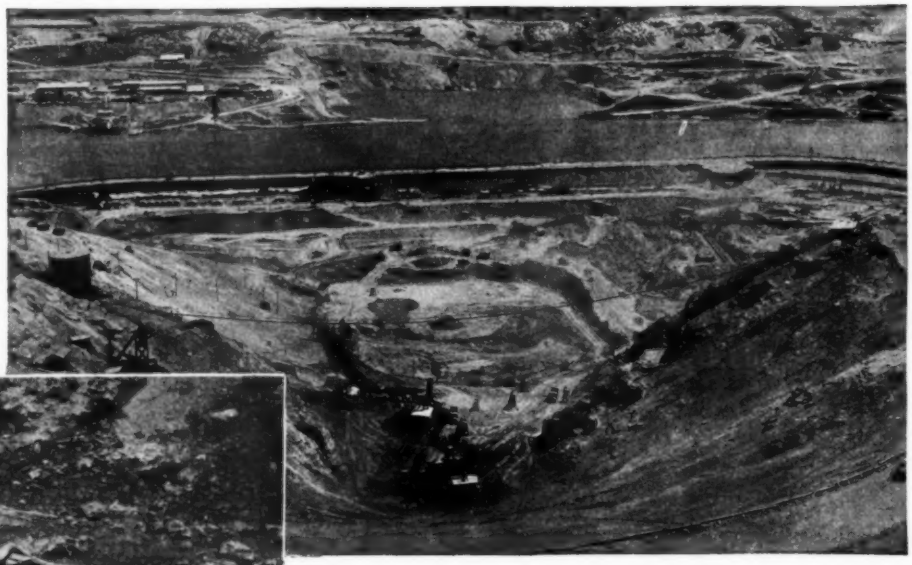
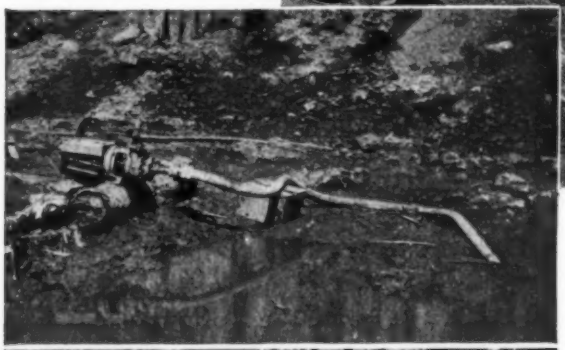
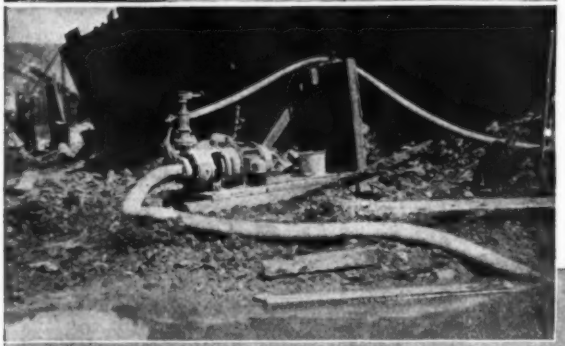
For your convenience in writing to Firestone Tire & Rubber Company, you will find a card bound in this issue.

MOTORPUMPS *Prove Their Adaptability At Grand Coulee Dam*



View of operations in the cofferdam on the Grand Coulee Project.





(Above) Motorpumps on the job at Grand Coulee Dam.

THERE are many MOTORPUMPS at Grand Coulee Dam handling water from sumps and drainage wells, cleaning out low spots and being used for general service on all parts of the job. They take all kinds of rough treatment—operating at almost any angle, standing out in the open, being dragged over rough ground, and receiving hard knocks in general.

MOTORPUMPS stand up under such treatment day after day. This ability combined with such features as low first cost, compact construction, easy portability and low power consumption makes it a favorite with contractors everywhere. Figure on Motorpumps for your next pumping job. They are available for immediate shipment.

Ingersoll-Rand

CAMERON PUMP DIVISION

11 Broadway, New York

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PUBLISHED MONTHLY
FOUNDED IN 1905

EXCAVATING ENGINEER

DEVOTED EXCLUSIVELY TO EXCAVATION

About Excavating Projects — By Excavating Men — For Excavating Men — The World Over

Vol. 30 DECEMBER, 1935 No. 12

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Looking Ahead

These interesting articles will appear in early issues of Excavating Engineer. Watch for them!

1936 Highway Forecast

Authentic and interesting information regarding 1936 highway construction by each of the 48 states will appear in the January issue.

Building Fort Peck Dam.

Dredging operations for the earth fill core, diversion tunnel construction, and the excavation for the spillway will be presented in a series of articles starting in an early issue.

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F. O. WYSE
Managing Editor

ARNOLD ANDREWS
Editor

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E. M. HEUSTON
Advertising Manager

E. T. OBENCHAIN
Assistant Editor

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THE LATEST IN METHODS, MATERIALS AND EQUIPMENT AWAITS YOU—at the

1936 CONVENTION AND ROAD SHOW

American Road Builders' Association
Cleveland, Ohio, January 20-24, 1936

Since the last Road Show great progress has been made in the science of building roads. You will want to know all about the new developments, new methods, and new equipment so as to be all set for the important year ahead. The Road Show and Convention will put you up-to-date.

FEATURES OF CONVENTION

- Continuation of an adequate highway program.
- Federal Aid for the construction of roads and streets.
- Use of highway revenues for highway purposes (no diversion of gasoline tax and motor vehicle license funds).
- Use of established governmental administrative agencies (Bureau of Public Roads; States; Counties; Cities).
- Highway legislation, Federal and State.
- Highway Safety.
- Construction to be carried on under economically sound principles of the contract system.

ALL BRANCHES OF INDUSTRY REPRESENTED

- City Officials Division
- County Highway Officials Division
- Educational Division
- Engineers and Officials Division
- Highway Contractors Division
- Manufacturers Division
- Pan-American Division

Don't Miss the "Old Fashioned" Road Show!

This year's big Road Show will point the way for 1936. It will have exhibits of all modern equipment, all new methods and all new types of materials. It will be the "World's Fair" of the Road Business. The demand for exhibit space is absolutely unprecedented, and the exhibits promise to be better than in any previous year.

No one can afford to miss this year's big show. It will give you new facts, new ideas, and new enthusiasm. It is the time to get new information and to meet old friends.

Make your reservations now. Cleveland hotel facilities are excellent, but reservations are coming in rapidly.

Bring the ladies. An interesting program of entertainment has been prepared for them.

All Road Builders' Roads Lead to Cleveland
January 20, 21, 22, 23, and 24

•

American Road Builders' Association — National Press Bldg., Washington, D. C.

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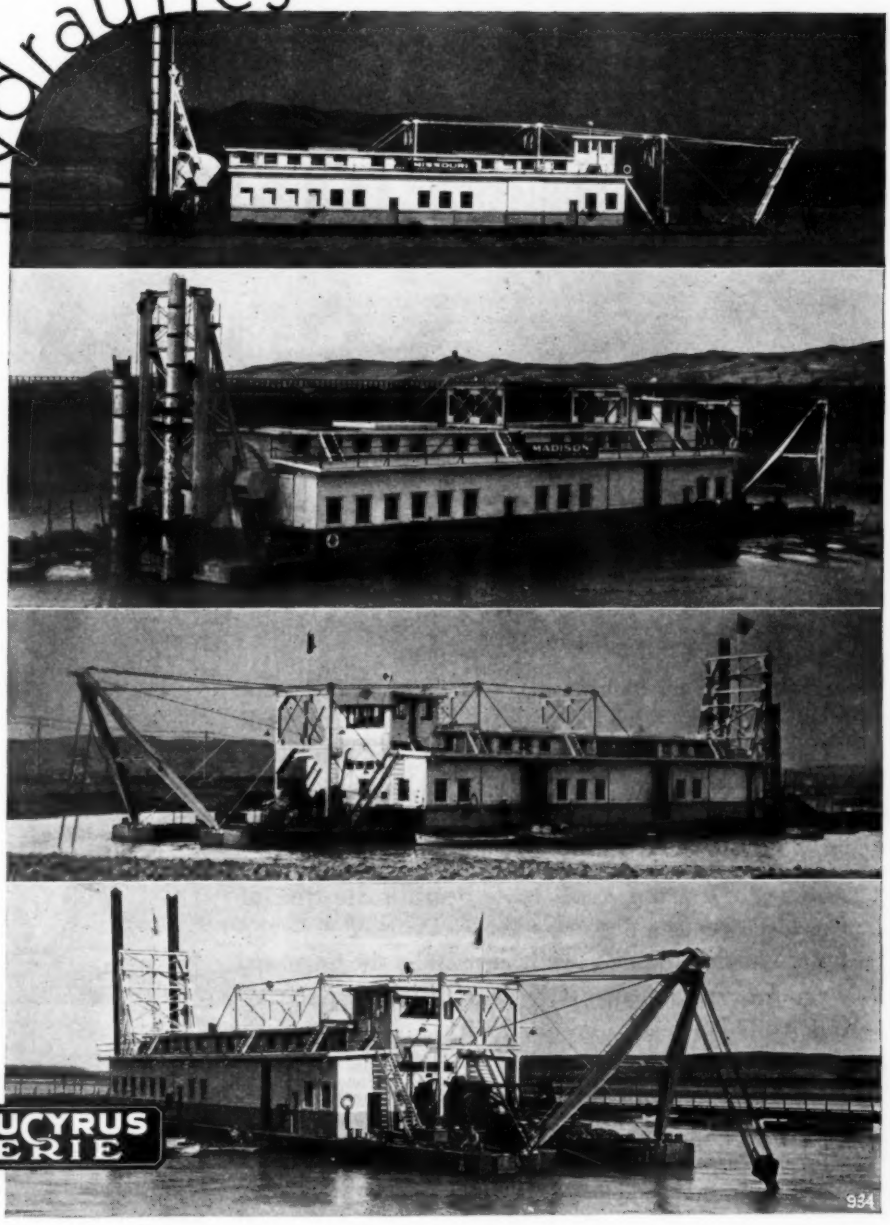
hydraulics



THESE four hydraulic dredges at Fort Peck Dam are built with Bucyrus-Erie pumps and digging equipment. On great hydraulic projects the world over, Bucyrus-Erie dredging equipment has proven its ability to give you bigger, steadier output, less delays, less grief, lower unit costs. Check into the savings Bucyrus-Erie dredges can make on your next job. Write:

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EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

Let's Look at Cordeau - - for *Giant Blasts, et cetera*

What do we mean by "et cetera"? Anything from giant blasts to single shots, with well drill, wagon drill or jackhammer holes; pocket, tunnel and broken loads; mud capping, demolition, ditching, and submarine . . .

Look at Cordeau Bickford Detonating Fuse *for better blasting.* Maybe you can use it profitably.

1. ***More work from explosives*** because the line of Cordeau acts as a detonator for *each* cartridge in the hole. The detonating wave is carried by the Cordeau.
2. ***Less hazard*** because Cordeau is an insensitive detonator—a lead tube filled with TNT. It must be detonated: ordinary shocks do not affect it.
3. ***Simplified loading*** because no primers are needed in the loads.
4. ***Better fragmentation*** because the Cordeau hook-up can be planned to fire each hole in rotation. *The time interval is infinitesimal,* yet it serves to *relieve burden.*
5. ***Equipment moved less often*** because drilling can be completed and all shots fired as a single blast—with Cordeau. When drills, pipe lines, compressors, scrapers, shovels and clearing gangs can be left in position until their work has been completed, we have a decided saving in time, labor and equipment.

Send for a copy of the Cordeau Book. There is no charge.
THE ENSIGN-BICKFORD CO., Simsbury, Conn.

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

CB-49

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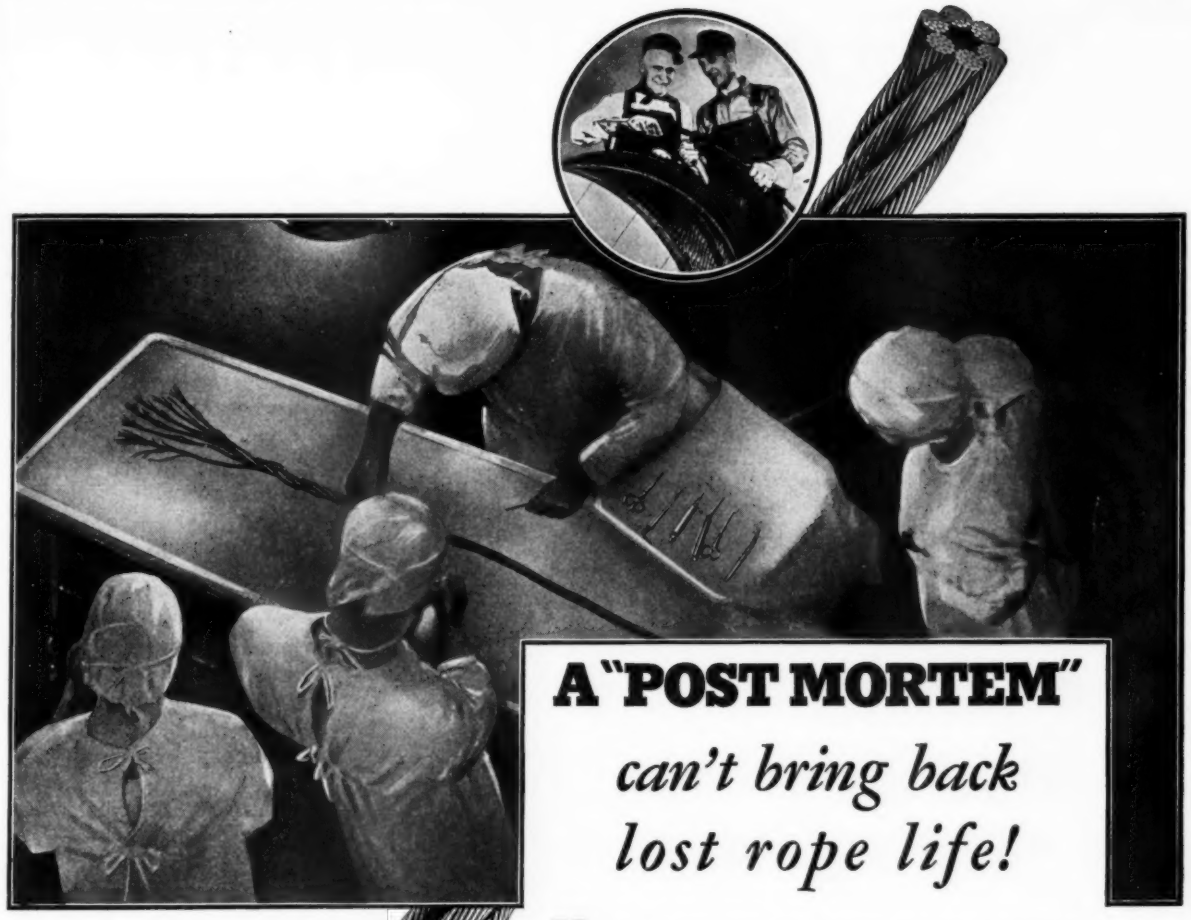

A "POST MORTEM" *can't bring back lost rope life!*

HOLD an investigation before the rope is used —and you'll never need to hold "post mortems" afterwards. Or—better still—save yourself the grief of trying to be a "rope doctor" by putting the responsibility for wire rope performance at the source where it belongs. The world's most experienced source for dependable wire rope—and incidentally the largest—is the American Steel & Wire Company—makers of Tiger Brand Wire Rope —the rope that outperforms and outsells all other brands. Use this source—and you'll be certain of getting the proper rope for the job it has to perform.

Tiger Brand Wire Rope is available in Standard (non-preformed) or Excellay (preformed) constructions.
Use Tiger Wire Rope Clips — identified by their yellow base.

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Not in the Contract

The walking boss called to his assistant and said, "There's a crap game going on behind the bunkhouse—break it up!" The assistant disappeared and was gone for the better part of an hour. Upon his return his boss demanded: "Did you succeed in breaking up the game?"

"Yes, sir," he replied.

"Well, what in thunder took you so long?"

"Well, sir," the assistant replied, "I had only two bits to start with."

"What is a budget?"

"Well, it's a method of worrying before you spend instead of after."

Sweet Young Thing: "Are you in town now for good?"

Travelling Salesman: "Well, I hate to commit myself."

Sergeant: "Did you shave this morning, Jones?"

Recruit: "Yes, sergeant."

Sergeant: "Well, next time stand a bit closer to the razor."

Five-year-old Arthur at three o'clock in the morning.

"Tell me a story, mother," he begged.

"Quiet, dear," replied his mother. "Daddy will be in soon and tell us both one."

Bookkeeper: "Well, Boss, we are out of the red for the first time in months, but we have no black ink."

Contractor: "Great! Go out and buy a bottle."

Bookkeeper: "Can't do that—it will put us in the red; we made only 8c."

The lightning bug is brilliant
But he hasn't any mind—
He blunders through existence
With his headlight on behind.

Judge: "You admit you drove over this man with a loaded truck?"

Driver: "Yes, your honor."

Judge: "And what have you to say in your defense?"

Driver: "I didn't know it was loaded."

A young lady and her aunt, returning home from work on pay day, were relieved of their money by a stick-up man. The young lady, rushing over to a policeman, exclaimed, "I've been robbed of my pay and my aunt's pay."

"Cut out the pig Latin and tell me what happened," the copper ordered.

Smith: "Why, old man, I thought you were dead."

Jones: "What led you to think I had passed away?"

Smith: "I overheard some people on the street speaking well of you."

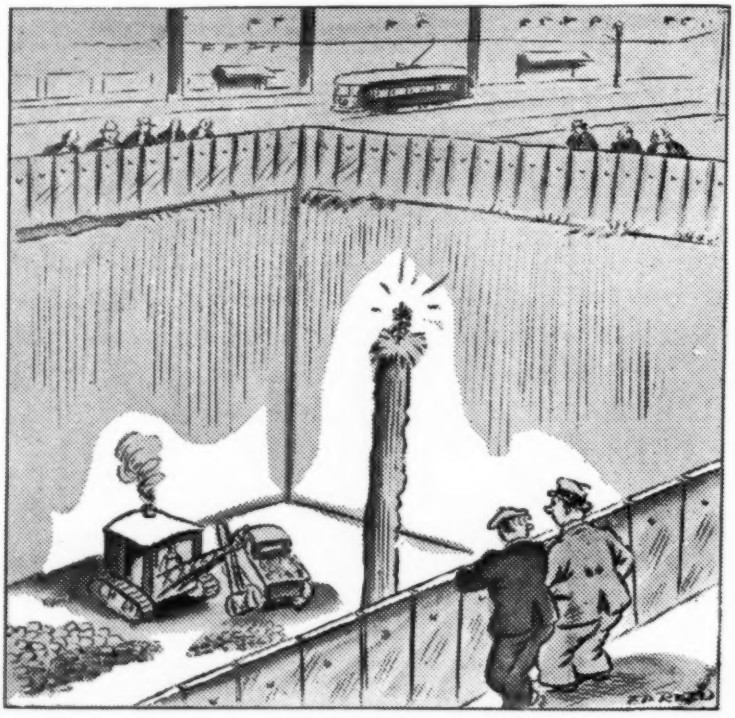
"My wife always gets historical when I stay out late at night."

"Hysterical, you mean."

"No, historical. She digs up all my past history."

"Look, that's the school where I learned to drive."

"You mean that's your alma motor?"



—COURTESY ED REED—THE REGISTER & TRIBUNE SYNDICATE

"He's sentimental about daisies!"

Lena Svenstrum had worked for two years for a certain family of high social aspirations and had been kept quite busy. Finally it was decided that all members of the household must be vaccinated but the question came up, where to vaccinate Lena so it would not interfere with her work.

"How about an arm?" asked the doctor.

"I'm afraid she would not be able to do the dusting and other housework," said the lady of the house.

"The leg should be the place then," suggested the doctor.

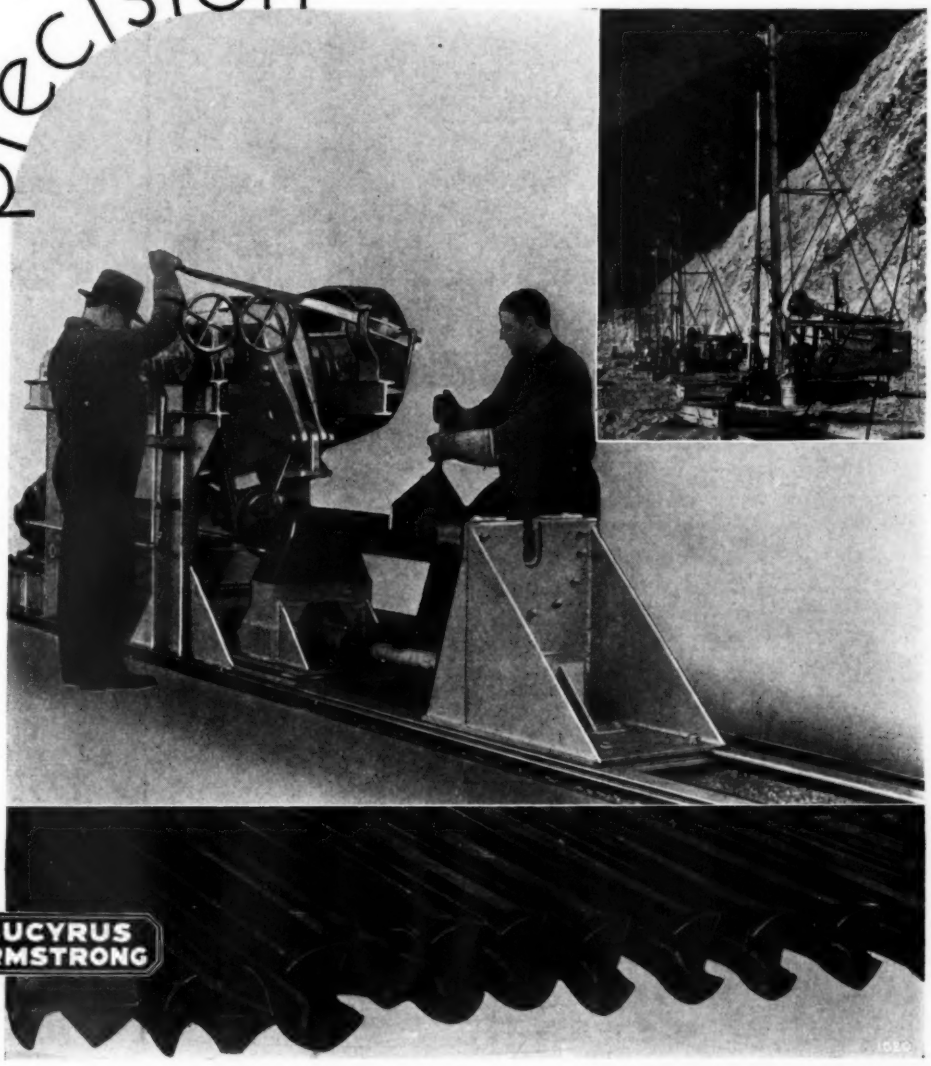
"That would interfere too," objected the lady, "because she has to get down on her knees every day to do the scrubbing."

"Well, exclaimed the M.D., scratching his head, "I don't know, I'm sure, just where to vaccinate her so it won't interfere with some of her work. Have you any suggestions, Lena?"

"Vell," replied Lena, pondering deeply, "Ay don't get mooch time to sit down."

PRECISION mechanical dressing of your blast-hole bits will give you an increase of 30 to 50 percent in drilling speed. In addition to increasing the speed of penetration Bucyrus-Armstrong mechanical bit dressers practically eliminate stuck bit troubles, reduce the cost of sharpening. Make any required shape accurately and exactly to size in about one-third the time required for hand dressing. There are two models, the "8" for 5 to 8-inch bits, the "12" for 8 to 12-inch bits. One of these dressers will show prompt profits on any rock drilling where more than one drill is working steadily.

precision



BUCYRUS ARMSTRONG

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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● *Top: Just before a big shot—a final check up of the wiring connections to over 500 holes. Note distance between inside row of blast holes and vertical rock faces of recesses for water wheels. To localize shattering effect of blast, a channel has been drilled in front of the recesses. Bottom: The firing switch is closed—and up goes the rock.*

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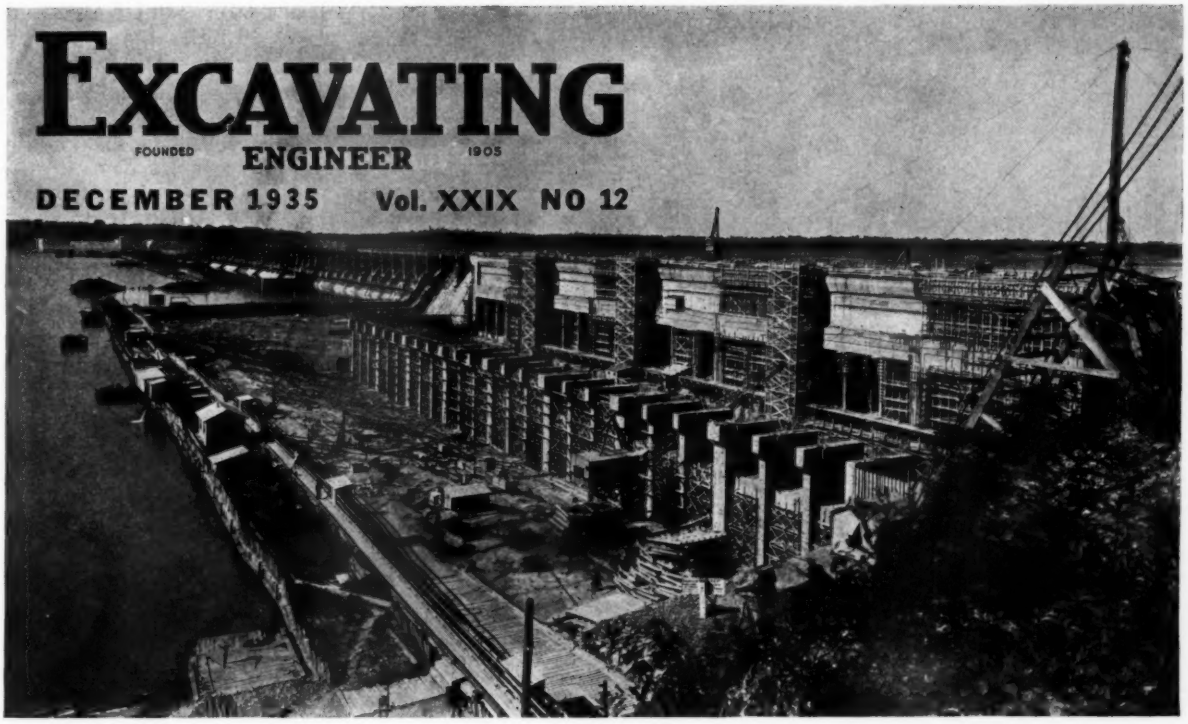


● *A recent view of the 6400-foot Wheeler Dam taken from the top of the south abutment near the power house on which construction work is well under way. At the far end of the dam may be seen the completed navigation lock.*

Wheeler Dam Nears Completion

Foundation excavation on TVA's $23,000,000 Dam, involving 570,000 yards of limestone rock, featured by line drilling methods.

By W. Burr Cullom

THE NEED for navigation aids on the Tennessee River has been acutely felt for over a hundred years. At two different times during this period canals were built around the dangerous Shoals near Florence, Alabama, to meet that need, but in both instances the results were inadequate. Those first attempts, however, were the forerunners of the vast and highly ramified program now being undertaken by the Tennessee Valley Authority.

The physical features of this comprehensive program form a chain of interrelated projects which embrace not only the aids to navigation originally sought, but also remedial measures for flood control, the effects of which will be felt throughout the lowlands of the Tennessee River basin, and will extend to the flood plain of the lower Mississippi Effective flood control leads naturally to steps for the prevention of soil erosion by reforestation and the elimination of unproductive lands from agriculture.

The building of a series of dams for navigation and the storage of excessive rainfall brings power possibilities. The tremendous energy to be developed by the dams will play a decidedly important part in national defense and in agricultural reconstruction. In addition, the surplus energy will permit an electrification program that will ultimately benefit not only the Valley people but the manufacturers of electrical equipment elsewhere.

A highly complicated method of river control has been worked out. The Tennessee River is about 850 miles long and drains an area of 40,600 square miles. During heavy general rains, three distinct peaks from tributaries may pass down the main stem before the arrival of the peak from the upper reaches of the river. Should two or more of these peaks synchronize, great damage would be caused. High dams at strategic points will store the floodwater in large reservoirs and release it as needed through power houses, thus leveling out the flood peaks, producing electrical energy, and providing ample depth of water in the navigable channels.

Wilson Dam, which was

started during the World War as a national defense measure, and completed in 1925, is now an integral part of the plan. The energy of this dam was allowed to go to waste during several controversial years, but it is now furnishing electricity to several small cities and rural communities. Norris Dam, located far upstream on the Clinch River, a tributary of the Tennessee, will be used primarily for storage

● *Line drilling was used extensively especially in the power house excavation area. This method of drilling eliminated overbreaks with a resulting saving of concrete.*

purposes. An article on Norris Dam appeared in the June 1934 *Excavating Engineer*. Wheeler Dam and Pickwick Dam are also important links in T V A's program, and are now being constructed. Work at Pickwick was started early this year.

Wheeler Dam Will Create Lake 85 Miles Long

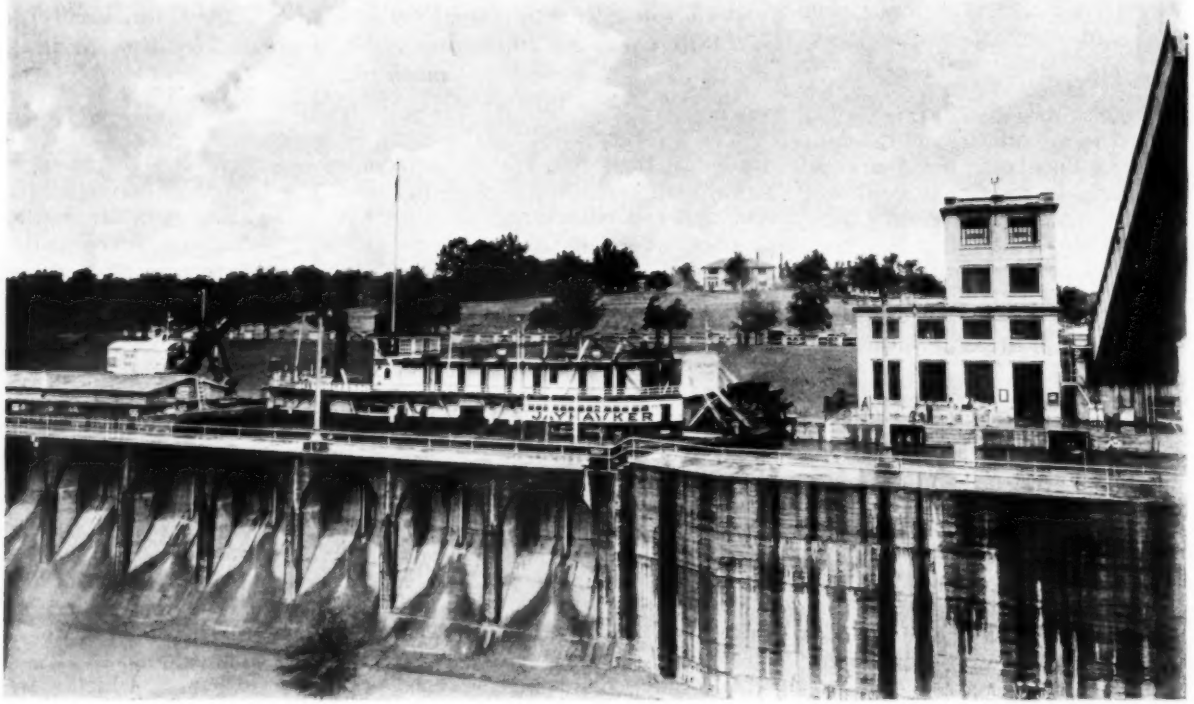
This $23,000,000 dam, 6,335 feet long, is being built across the Tennessee River, about 15 miles above Wilson Dam. This concrete structure will be 72 feet high from base to top of piers and 54 feet thick at the base. When completed next year, it will create a reservoir of water approximately 115 square miles in area and 85 miles long.

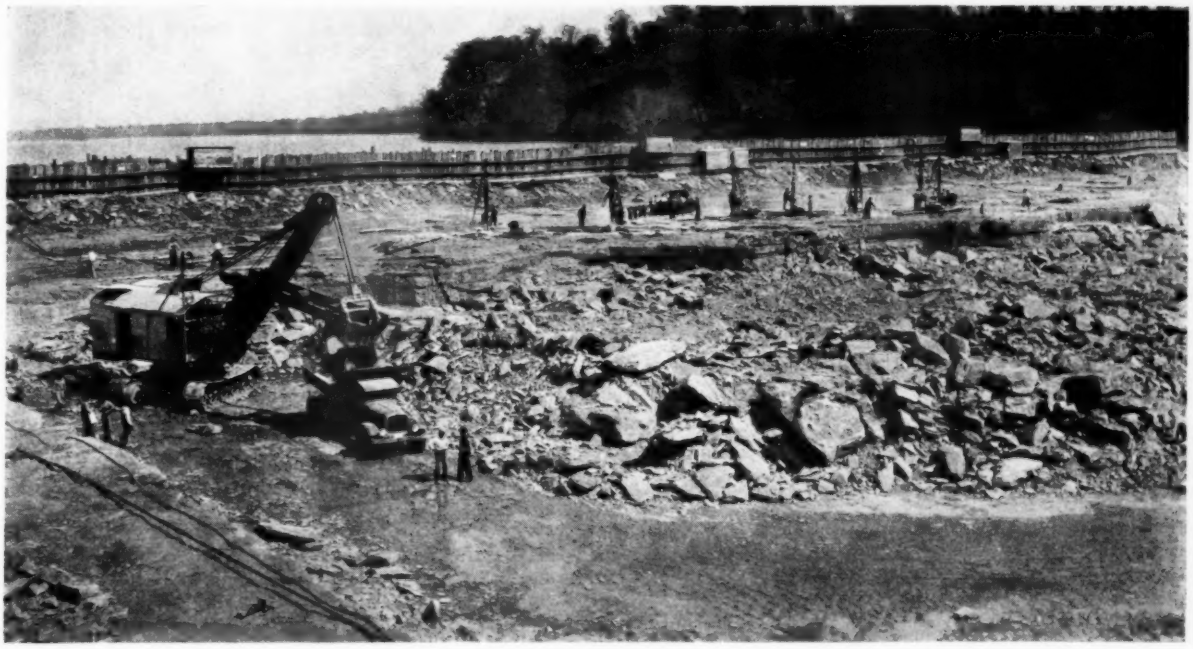
Work was started on the first cofferdam during the last days of November 1933. The work is now (December 1935) about 80% complete. The outer end of the cofferdam wall extends to the navigation lock located near the northern bank of the river. This lock, already completed, will easily handle any craft that plies the Ohio River, and has a single lift of 50 feet.

Extensive Foundation Exploration Made

The location of a sound foundation for a dam of this size was, of

● *When the Bucyrus-Erie 75-B electric shovel finished its work at Wheeler it was loaded aboard a barge and transported 58 miles downstream to the site of the Pickwick Landing Dam. The view here shows the shovel passing through the navigation lock at Wilson Dam.*





course, of the utmost importance. Exploratory work, carried on by U. S. Army Engineers was completed during the summer of 1933.

Hundreds of 4½" cores were extracted from the river bed and abutments, both diamond and shot core-drills being used. The cores showed that the rock was chiefly of dolomite and siliceous limestone, lying in nearly horizontal beds of a massive type. The strata alternate with layers of a very fossiliferous and almost pure limestone. Although solution caverns were found in a few places, these were usually small. However, two large ones were found in the foundations of the draft tubes in the power house section. Caverns were usually found filled with clay and mud. The larger ones were blocked off with line drilling, cleaned out and filled with concrete so as to prevent any possibility of future seepage.

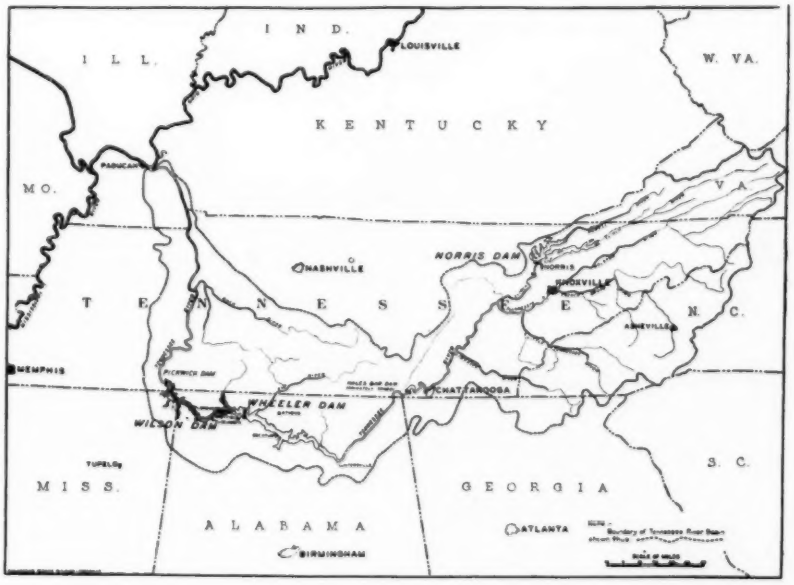
In order to get a clear idea of the rock structure, an effort was made to examine the interior of the test holes. A periscope was used in this attempt. While useful information was gained by this means, the seepage water rose so rapidly that other needed data could not be obtained.

● *Plenty of blasted rock here! The 2½-yard shovel loads to 10-yard heavy-duty trucks. About 280,000 yards of rock were removed in excavating for the power house.*

36-Inch Core Drills Provide Needed Data

A unique feature of the exploration at Wheeler was the use of 36-inch Ingersoll-Rand core drills. The large holes bored with this equipment permitted easier pumping of seepage water, and also made it possible for the geologists and engineers to descend to the bottom of the holes, and to be brought up slowly to the surface while they made an examination of the rock structure and grouting.

Photographs of the interior of each hole were made. Identification marks had been made on the wall and elevations noted. The prints were matched by these markings and glued together to form a continuous photographic



● *The Tennessee River is the fifth largest river in the United States. Over 2,000,000 inhabitants occupy the Tennessee Basin which has an area of approximately 40,000 square miles.*

● *One of the first jobs performed by the shovel after the power house cofferdam had been dewatered was the removal of muck and loose rock.*

record or profile with sharp outlines. Bedding planes, stratification, elevations and the character of the rock are clearly shown in the pictures.

Cofferdam Construction

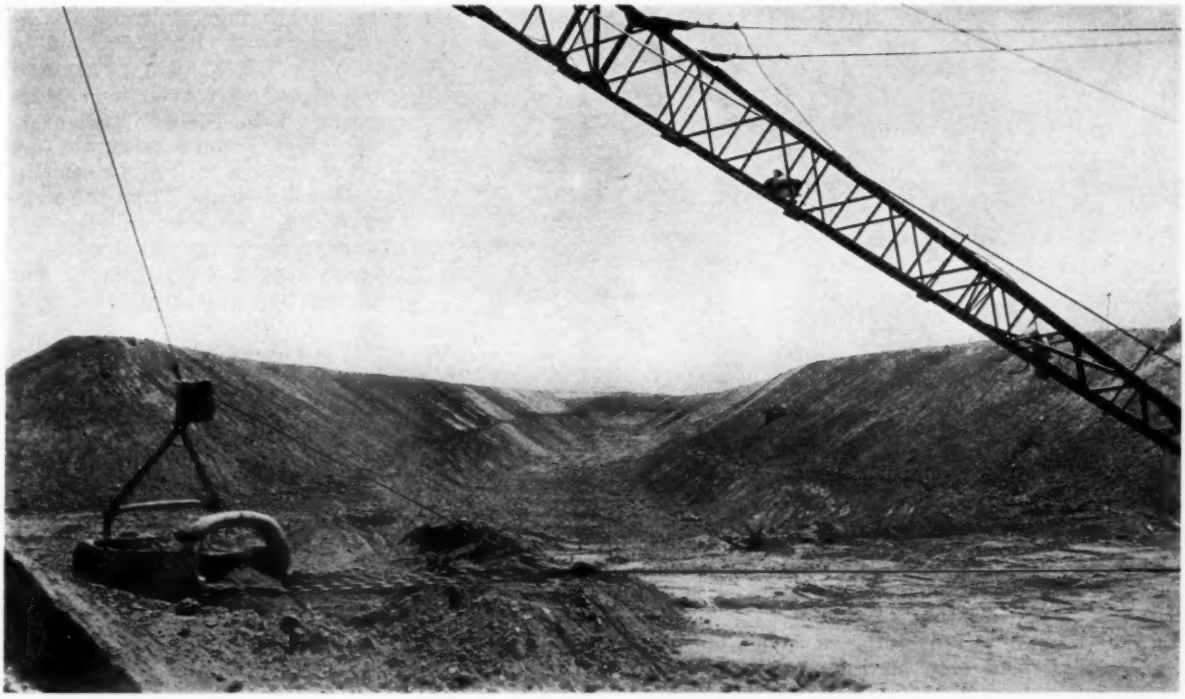
A river diversion plan, using five cofferdams, and adaptable to variations in construction schedule, has been adopted for construction of the dam. Beginning with the south cofferdam, which encloses the power house site, their lengths are respectively 1,425 feet, 1,238 feet, 1,147 feet, 1,100 feet, and 1,004 feet. It is the intention to have only two adjacent cofferdams closed for any considerable time during each of the five stages.

● *Five Ingersoll-Rand wagon drills put down a series of blast holes. In the power house area the excavation reached a depth of 57 feet.*

The dam, except that portion of the non-overflow section in cofferdams 4 and 5, and a portion of the spillway section in the center, will be built in alternate 15-foot and 30-foot blocks. As soon as the 30-foot blocks are placed up to elevation 506, which is one foot above the Wilson pool, the 15-foot blocks are built up above flood height, and the cofferdam may be removed and water diverted through the 30-foot openings. Water may also be diverted through the six future intakes, having floor at elevation 498, when they are completed. During different stages of construction, flood water will be passed through various combinations of intake, 30-foot diversion openings, and restricted river channel.

The first cofferdam, which encloses the power house, is about 400-feet wide and 1425 feet long. Prolonged work and the 57-foot deep excavation necessary here required a very strong cofferdam.

(Continued on page 580)



● *A neat job of excavation! Approximately 3,000,000 yards of dirt were moved on Haas, Doughty & Jones' 10-mile section adjacent to the main reservoir near Columbus.*

Detouring Loup River

Public power development in east-central Nebraska involves 12,000,000 yards of excavation for 40-mile canal and reservoirs.

By **D. W. Evans**

A TRAVELER, westward bound across Nebraska on the Lincoln Highway, can't help noticing the large amount of construction work going on within that state. The first project encountered is that one near Columbus, where the Loup River Public Power District has been organized to harness the Loup River and by means of canals, reservoirs, and power houses, to generate and supply vast amounts of electrical energy to the inhabitants living within a radius of 100 miles.

Farther west, the Central Nebraska Public Power and Irrigation Project, near Hastings, is getting under way, having been allotted $10,000,000 by P. W. A.

Another 100 miles to the west is found the Platte Valley Public Power and Irrigation District with its $10,000,000 project nearly completed. Known as the Sutherland Project, the construction of its 65 miles of canals and two reservoirs was described in the November 1935 issue of *Excavating Engineer*.

These three projects will provide benefits to the inhabitants of Nebraska's fertile farms and thriving cities in the way of cheaper electricity, adequate supply of water the year round for irrigation when needed, and the prevention of floods which have caused considerable damage in the past.

● *This 5-W dragline has obtained outputs of 10,000 yards per day, operating four 6-hour shifts.*

$8,700,000 Hydro-Electric Project

The construction of the Loup River Project presents many

● *Condon and Kiewit are building the main reservoir. Their contract calls for the removal of 2¼ million yards, a part of which was handled by the Bucyrus-Erie E-2 Diesel-powered dragline shown here.*

interesting features, especially from an excavating angle.

Briefly, this job is a hydro-electric project to generate power for farm use, and for the principal cities nearby, Columbus, Lincoln, and Omaha. The work involves the construction of two storage reservoirs, 40 miles of canal, a diversion dam on Loup River and a power house near Columbus. The cost is estimated at $8,700,000. This money will be spent in part for the excavation of 12,000,000 cubic yards to form the power canal and reservoirs. On this work at present are 12 draglines and a power shovel, the machines ranging in size from 8 yards down to ¾ yard. Dirt is being moved at the rate of 1,000,000 yards per month.

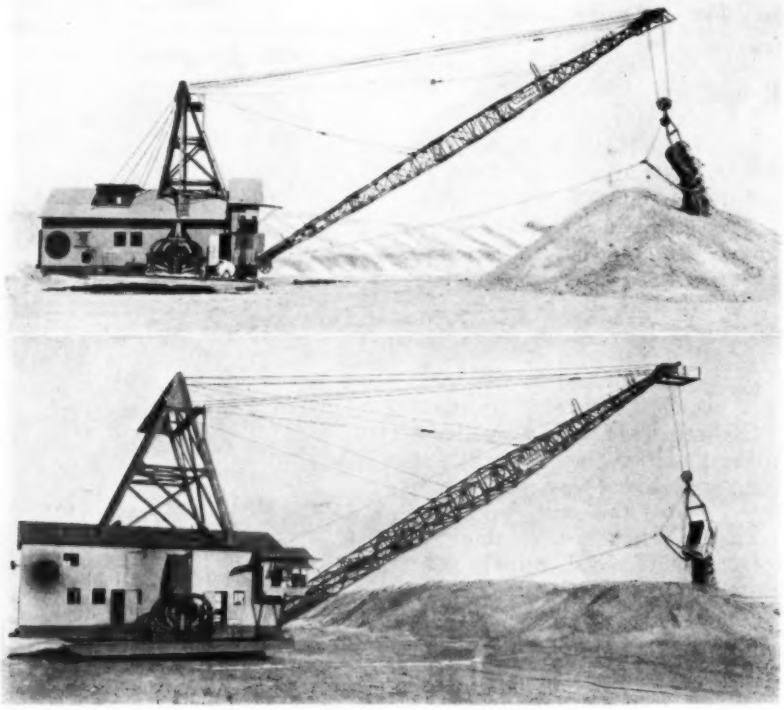
Columbus, a busy town of 6,000, is the metropolis of Platte County. The Platte River, principal drainage channel for the entire state, is practically dry a large part of each year. The Loup River, which empties into the Platte near Columbus, has its source at Moon Lake 175 miles to the northwest, attains less maximum size each year than the Platte, but carries a larger average volume of water. So a dam and weir are being constructed near Fullerton at the head of a canal to carry Loup River water eastward to a storage reservoir near Monroe, and from there farther eastward to a storage reservoir and power house a mile or two northeast of Columbus. From the power house a six-mile tailrace will bring the water southward to empty into the Platte somewhat east of its natural junction with the Loup River.

While every phase of the project at the time of our visit was not under construction, the following contractors were extremely busy on the excavating portion of the work:

● *A Union Pacific construction crew drives piles for a new bridge which will carry the railroad tracks across the canal.*

Carlson Sand Company, Columbus, have just completed the erection of a 1¼-yard Bucyrus-Erie Diesel shovel, to be used on construction of a weir at Genoa.

Hardwick Construction Co., St. Louis, has nearly completed the excavation of 18 miles of canal, extending from the dam site near



● *Top: 18 miles of canal extending eastward from the diversion dam on the Loup River is being dug by the 6-W dragline on Hardwick Construction Company's contract. Below: Martin-Day use a Bucyrus-Monighan 6160 dragline for the excavation of the 6-mile tailrace section east of Columbus.*

Fullerton eastward through Genoa and past the site of the proposed upper reservoir near Monroe to a point south of Platte Center. Principal equipment used is a 6-yard Monighan special 6-W dragline, supplemented by a 1½-yard Northwest No. 7 dragline.

Abel and Dobson, Lincoln, have one of the more important siphon contracts, running the canal beneath an intersecting creek. Pile driving and excavating are handled by two convertible ¾-yard machines; two Blaw-Knox bins and a Koehring mixer handle the concrete; 3 Jaeger pumps help to create approximately dry working conditions.

Haas, Doughty & Jones, and Marshall Stacy, San Francisco, have a Bucyrus-Monighan 5-W dragline and a Bucyrus-Erie 50-B Diesel dragline, on a 10-mile section of canal extending from Hardwick's section eastward to the main reservoir near Columbus. This section of canal involves 3,000,000 cubic yards of excavation.

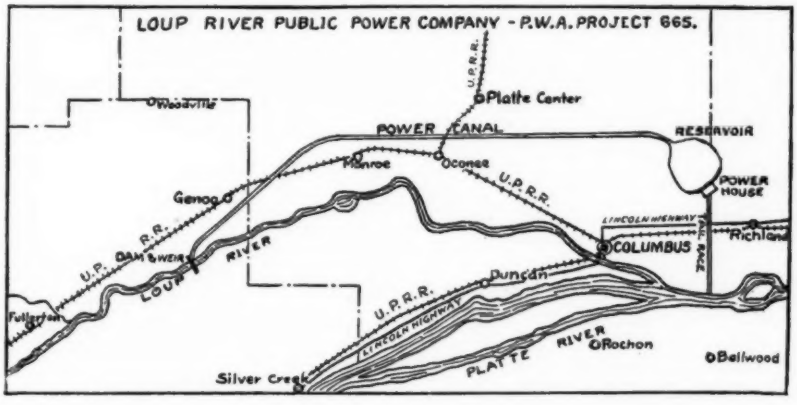
Condon and Kiewit, Omaha, have the contract for the main reservoir near Columbus plus two miles of power canal at the entrance to and outlet from the reservoir. A Bucyrus-Erie E-2, and a Northwest No. 6—both 1¼-yard draglines, are handling this contract, ably assisted by two Caterpillar Diesel 50s with bulldozers, crawler wagons and scrapers. Over 2,250,000 yards of dirt must be moved and placed on this contract.

● *Water is encountered on parts of Hardwick's contract. The dragline has completed one side of the canal section and is now working on the opposite side digging it out to full width.*

Martin-Day, Lincoln, has the last section of canal, the tailrace 6 miles long, from the power house almost due south to a weir at the Platte River. The bulk of the 3,310,000 yards of excavation here is handled by an 8-yard Bucyrus-Monighan 6160 dragline. A Bucyrus-Erie 1035 dragline is used to trim slopes.

These six principal contractors, plus several others working on culverts and minor siphon contracts, are engaged on what is

● *Left: Another bucketful of dirt is dumped into the spoil bank on Haas, Doughty & Jones' contract. The spoil piles are built on areas from which the top soil has been removed. Below: This sketch shows the approximate route and length of the Loup River Power Project. Over 12,000,000 yards of excavation are involved at the completion of this work.*



● *Martin-Day's big dragline completes a section of the tailrace to the whole width. Digging sand under water is usually a handicap toward obtaining high output, yet this machine has moved well over 200,000 yards per month.*

known as Public Works Project No. 665—The Loup River Public Power Project. A loan and grant of $7,300,000 was obtained from P. W. A. The work is under the general supervision of the Bureau of Reclamation, and is one of 24 reclamation projects supervised by its Denver office. The Public Power District sponsoring the job has turned the management of it over to Harza Engineering Corporation, Chicago, who, in their capacity as consulting engineers, maintain offices in Columbus, prepare specifications, receive bids, supervise the various contractors, and approve the various sections of the project as they are completed.

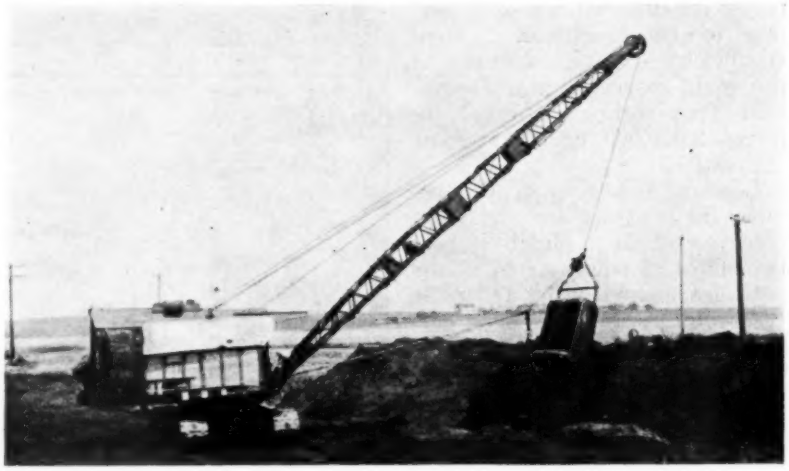
Work on the three main canal contracts is so well organized by the contractors that a casual view of the excavation makes one believe the whole project a simple one. A closer inspection reveals many difficulties.

Difficult Wet Excavation on Hardwick Section

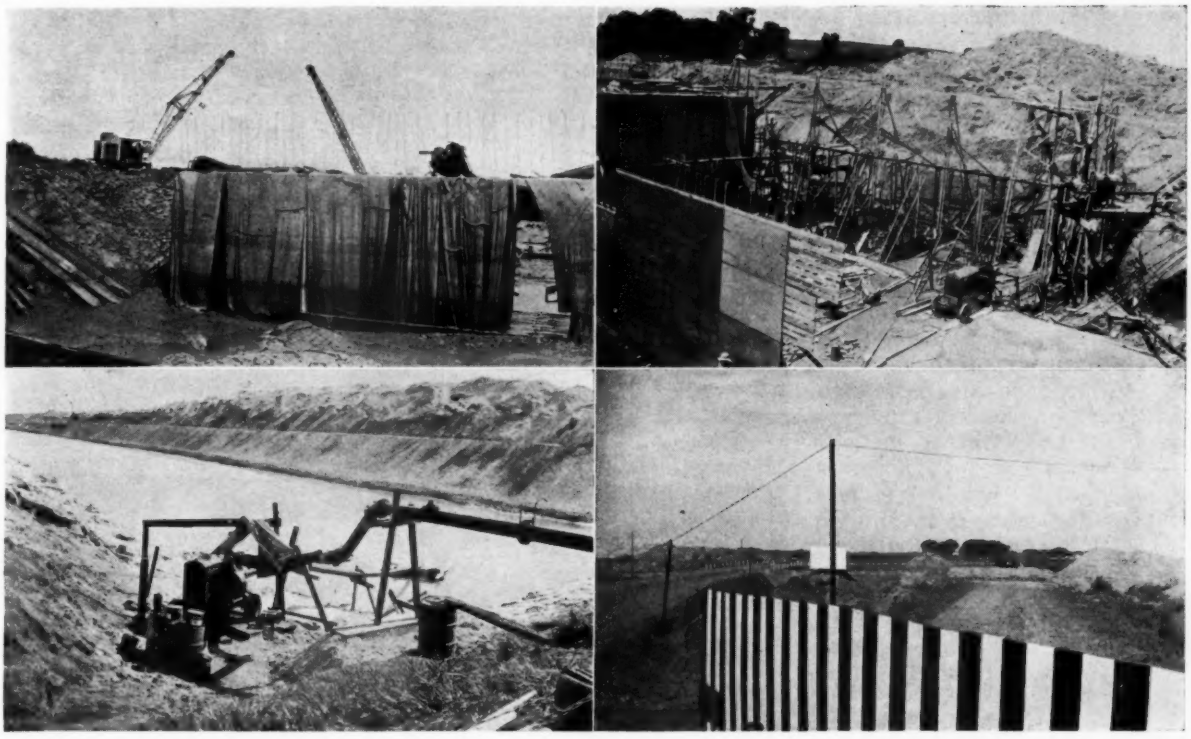
The material handled on the various sections contains no rock.

Three general classes of soil encountered are sand, clay, and a substance much like marl. This latter material is causing complications on the Hardwick portion of the ditch. The Monighan 6-W has encountered considerable under-water digging, made doubly difficult by the marl which slumps so when dumped on the canal bank that accurate sloping is a real problem. This contractor, with years of experience building levees along the Mississippi, has solved this sticky problem in the following workmanlike manner:

The Northwest dragline, normally used for finishing the slopes behind the Bucyrus-Monighan, works ahead of the big machine throwing up low dikes along the fill line to prevent the wet clay from spreading too far. The larger machine, excavating half of the ditch at a time, casts the material in front of the dike, placing it as nearly as possible in its final position. Creation of the final slope is delayed until the clay has dried out suf-



● *A 50-B Diesel dragline is used by Haas, Doughty & Jones to remove topsoil to a depth of 18 to 30 inches over the entire width of the canal bed, the dike bottom, and the borrow area.*



● *Top left: Abel & Dobson construct a concrete siphon which will carry the canal under an intersecting creek. Two ¾-yard cranes, a P&H and a Bucyrus-Erie, excavate the ditch ahead of the forms. The concrete wall in the foreground is protected with sheets of canvas which are kept damp while the concrete cures. Top right: A view of the form work used on the siphon contract. Bottom left: A Hercules engine-driven Jaeger centrifugal pump keeps the water level down in a section of the tailrace. Bottom right: A new bridge will be constructed later to carry Lincoln Highway across the Canal. Note the barricade, well marked to give easy visibility, which diverts traffic to the detour.*

ficiently to stay put. Then the Monighan roughs out the proper bank profile and later, when the clay is well packed, the Northwest completes the job on a 1 to 1½ slope.

Monighan 5-W Turns Out Good Yardage

On the Haas, Doughty & Jones' contract, work was started in October, 1934, using a Bucyrus-Erie 50-B Diesel dragline, equipped with a 3-yard bucket and a 60-foot boom. In February, 1935, a Bucyrus-Monighan 5-W dragline was shipped to the work.

Working through a shallow valley between parallel ridges, these two machines have been piling up record yardage, partly due to the fact that no water has been encountered. The big 5-W, equipped with an oversize bucket to handle the lightweight material, has been kept in the heaviest cuts.

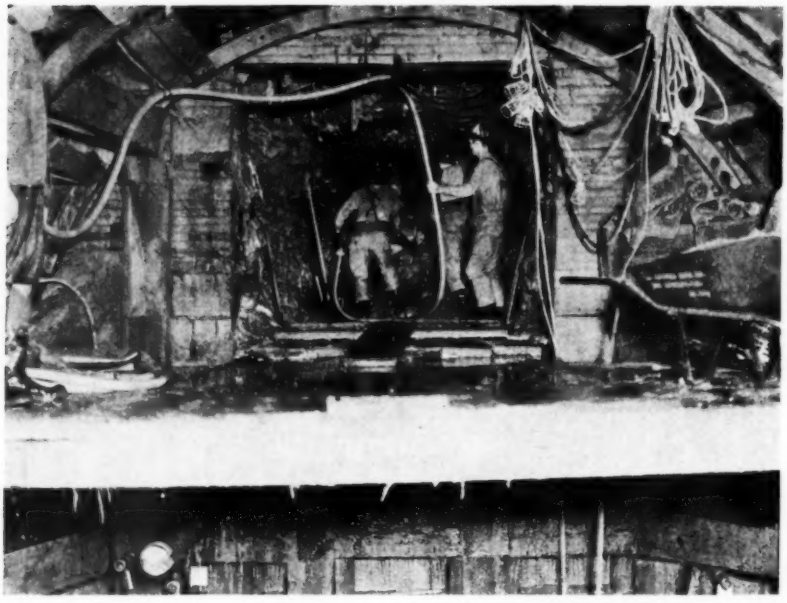
An interesting feature of this section of canal is that much of it is above the level of the country. Owing to the pervious nature of the top soil, the 50-B has to remove this to a depth of 18 to 30 inches, over the entire width of the canal bed, the dike bottom, and the borrow area. In addition, it supplements the 5-W in placing fill in the banks. Lacking the reach of the larger dragline, the 50-B is cleverly routed over the job in such a way as to reduce any rehandling to the absolute minimum.

Both machines on this job, and in fact practically every one of the 12 draglines on the project, operate four 6-hour shifts per day, to provide a maximum of employment. As far as possible final placement of the slopes of the dike bank is made during daylight hours. So accurate are the operators selected by Superintendent Arthur Jones that a two-man crew on one shift can handle all the hand finishing of slopes required.

Superintendent Jones, is enthusiastic about the performance of the new Bucyrus-Monighan dragline. For that matter so is everyone else on the job. Fast and powerful, this up-to-date machine retains the famous walker feature, is more ruggedly built, more stable, and speedier than its predecessors in the field. The easily-operated controls were especially mentioned as an aid to continuous high yardage.

Consistent high speed operation around the clock, day in and day out can be achieved only if the equipment can stand the pace. During the latest month for which figures are available 320,000 yards of pay dirt were moved by the two draglines, of which the 50-B was credited with 80,000. Because of wet weather this checked out as a 23-day month, from which figures we calculate that the Bucyrus-Monighan has been averaging a little over 10,000 cubic yards per day. Barring unforseen delays, at this rate, the last bucketful of dirt should be in place by Christmas. Anyhow, Mr. Jones sincerely hopes he won't have to spend another

(Continued on page 586)



● *A pilot drift is advanced through the sandbag bulkhead, 8 feet thick, to reach the grouted area ahead of it.*

Driving A Tunnel Under Difficulty

Metropolitan Water District Engineers advance San Jacinto Tunnel through crushed zone and against heavy waterflow with the aid of sandbag bulkheads.

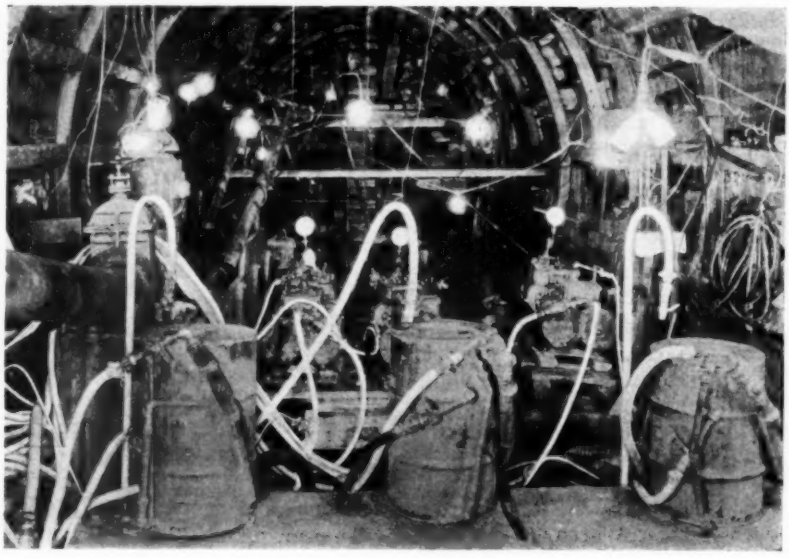
By K. Campbell

ABOUT a year and a half ago, July 1, 1934, to be exact, drilling operations on the San Jacinto tunnel ceased when water broke into the east heading of Potrero shaft and flooded both legs of the bore and the shaft to a depth of 647 feet. The shut-down lasted seven months, during which time strenuous but unsuccessful efforts were made by the contractor to unwater the shaft and resume drilling operations.

Believing the construction problems of this 13-mile tunnel were not insurmountable, General Manager Weymouth of the Metropolitan Water District announced that beginning January 15, 1935, the tunnel would be driven by force account. At that time approximately 17 per cent, 14,734 feet, of the total footage was driven, according to the District reports available.

Actual driving by the District forces under C. R. Rankin, general superintendent, commenced a month later. Investigations showed that in driving the east heading a flow of 2900 gallons per minute was brought in by blasting into a crushed zone. This zone crossed the tunnel line at a sharp angle, and the flow was largely from the top and one side.

After a study of various means of cutting off the flow of water,



● *High pressure pumps force grout into the broken ground ahead of the bulkhead braced by the heavy timbers shown in the background.*

it was decided to use an eight-foot thick sandbag bulkhead, braced with timber, through which high-pressure grouting in the zone ahead might be carried on. The sandbags were laid layer upon layer right up to the breast-boarding. Cement was sprinkled on each layer of wet bags which were then tamped down to form a solid bulkhead. Then a timber bulkhead with braces carried back to the rock side walls was placed behind the sacks to prevent their movement. Five six-inch drain pipes with control valves at the outer end were carried through the sandbag bulkhead to handle the water which was estimated to have a pressure of about 150 pounds per square inch.

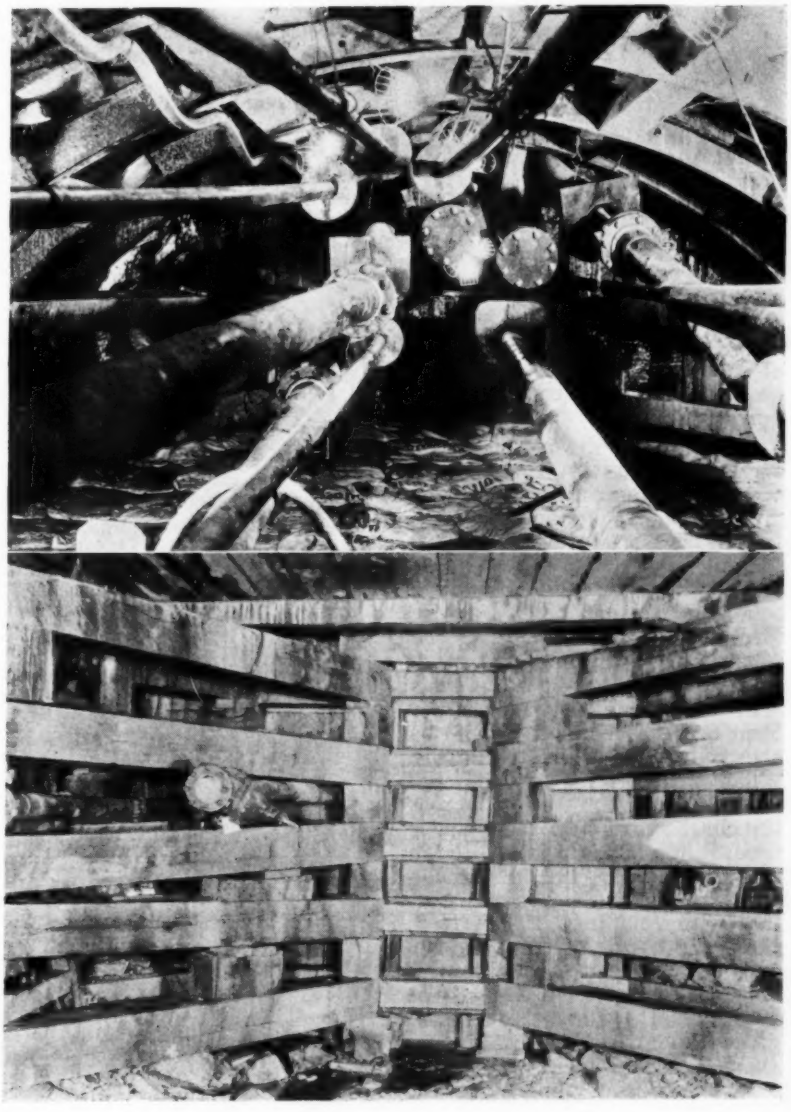
It was decided to limit the area of water pressure by grouting around the bulkhead, and allowing it to set eight hours. The grout consisted of a mixture of quick-setting cement, sawdust, and water. During the 8-hour setting period, the water pressure ahead of the bulkhead was relieved by opening the valves in the drain pipes. At the end of the period, the valves were closed, the pressure went to 140 pounds per square inch, and there was considerable leakage through and under the bulkhead. Additional grouting cut this down to a small flow.

Grout holes, extending 25 feet into the broken zone, were drilled around the perimeter of the heading. Grout, under 250 pounds pressure, was pumped into the area through the holes until filled and then allowed to set.

Upon opening up the bulkhead to resume driving, it was found that the broken ground had solidified and the water was practically sealed off. When operations had advanced farther into the broken zone, it was found that the grout had not penetrated beyond the ends of the 25-foot drill holes. It was necessary to repeat the bulkheading and grouting operations until the troublesome area had been traversed.

Similarly, it was decided to use this method of stopping the flow of water at West Portal of the tunnel, where a flow of 3,000 gallons per minute under high pressure had been struck while driving a 5x7-foot pilot drift through a zone of broken ground. Here, the full section of the tunnel was filled with well-tamped sandbags which were sealed along the rock walls with cement-sand mortar for a distance of 22 feet. These bags were backed up with a twelve-inch wall made up of 12x12 timbers heavily braced against the rock wall.

The water flow was handled through five 6-inch pipes as in the other shaft, and low pressure grout was again employed to seal up all leaks. Three 2-inch grouting pipes were placed through the bulkhead to a point well up into the broken ground. Grout was pumped in under a pressure increasing from 170 pounds to 750 pounds per square inch during a period of 36 hours, using duplex pumps. Again upon opening up the tunnel face, it was found that the flow of water was practically sealed off for a distance of 35 feet beyond the old tunnel face, permitting driving operations to be resumed.



● *Top: The temporary breast boarding at the face of the tunnel is pierced by numerous grout and water pipes. A wall of sandbags, wet and sprinkled with cement, are tamped in place to form a plug. Below: Heavy timber braces back up the sandbag bulkheads. The braces extend back to the steel ribs set in the rock wall.*

Field Notes

Straightening Cotter Keys

QUITE OFTEN on a repair job it is necessary to reuse old cotter keys because new ones are not available at the moment. Usually the old ones are badly bent and need quite a bit of straightening before they can be used again. This can be done easily with the aid of a common washer and a hammer used in

the manner illustrated. A few light blows and the cotter key is restored to its original shape and will slip easily into the hole through the shaft, pin, or nut it formerly occupied.

—*Frank W. Bentley, Jr.*

Making Pipe Bends

THIS CHART will be found useful for determining the average radius of bend that should be given to common forms of pipe bends, numbers 1, 2, 3, and 4, as shown at the right, column E.

Also knowing the radius of bend, the size of pipe, and the form of bend, column D gives the expansion allowance of that bend.

For example a 5-inch pipe was bent to a radius of 40 inches, the bend being a common U-bend as shown by No. 2 in column E. What expansion may be allowed?

The dotted line drawn across the chart shows how the chart is used. Run a straight line through the 5, column A, and the 40, column B, and locate the intersection with column C. Then from that point of intersection run over to the mark in column E opposite the Figure 2 and the intersection through column D gives the answer as 1.5 inches expansion allowance.

If the size of pipe were the same, 5 inches, the average radius 40 inches, and the bend were a "No. 4" bend, the expansion allowance would be 3.7 inches. If the bend were a "No. 1" bend the expansion allowance would be 0.75.

Similarly if the expansion allowance is already known, if the form of bend is known, and if the size of pipe is known, the average radius to which the bend should be made may be determined. In other words, knowing any three of the four factors given in columns A, B, D and E the fourth or unknown factor is easily determined by following the method as explained above.

The chart is based upon the following rules:

For Bend No. 1—Square the average radius of bend in inches and multiply by 0.0026 and then divide by the outside diameter of the pipe in inches.

Bend No. 2—Same as No. 1 but use 0.0052.

Bend No. 3—Same as No. 1 but use 0.0104.

Bend No. 4—Same as No. 1 but use 0.013.

In the chart all of these operations are already performed—the radii are squared, exact outside pipe diameters are employed, and the proper factors are used.

—*W. F. Schaphorst, M.E.*

Adjacent Building Collapsed

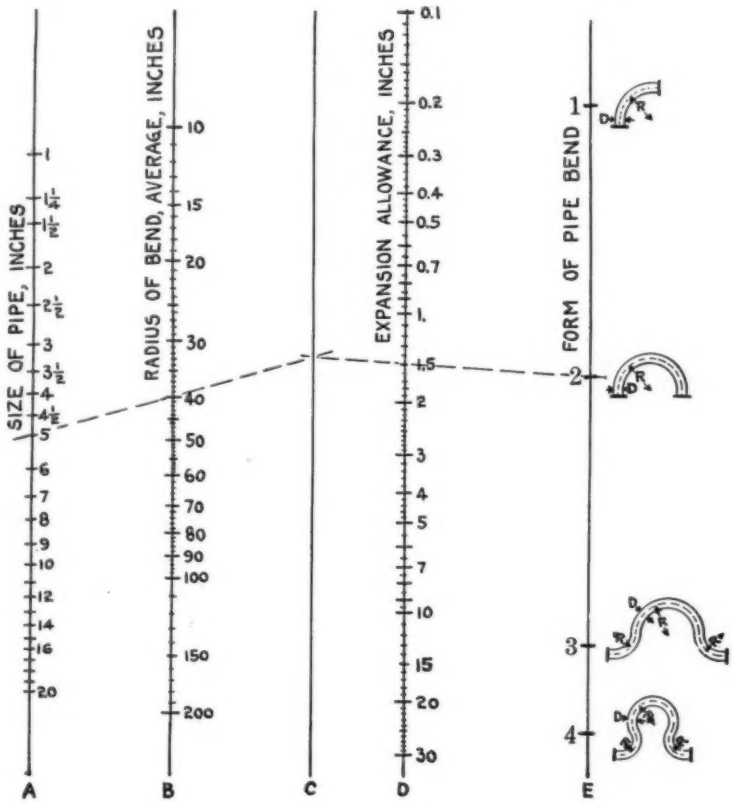
SIXTEEN thousand dollars is what the Michigan Supreme Court lately decided an owner of land, a building contractor, and an excavating subcontractor jointly owed the owner of an adjacent building that partly collapsed while a 14-foot excavation was being made in Pontiac.

Water was encountered in the excavation, and while piles were being driven through gravel down to clay, sand or soil began to run out from under the adjacent building. It was attempted to stop this by using tarpaulin and planking. But some days later, the building partly collapsed.

The adjacent owner's suit for damages was mainly based on a Michigan statute, binding an owner or occupant of land who excavates more than 12 feet below grade to protect adjacent land and buildings from subsiding.

Upholding plaintiff's right to

(*Continued on page 587*)



EQUIPMENT
You Ought to Know About

Improved Diesel Tractors Have More Power

CATERPILLAR Tractor Company, Peoria, Illinois, has introduced four new Diesel tractors, the RD-8, RD-7, RD-6 and RD-4, and a spark ignition machine called the Thirty.

According to the announcement, the first three Diesel models succeed the Diesel Seventy-Five, Diesel Fifty and Diesel Forty, and are comparable with them in everything except power. Engines in these three incorporate all the features that made the former models so popular and they achieve greatly increased power through an increase in cylinder bore from 5¼ to 5¾ inches and other refinements that have been made in the engine and fuel injection system.

Drawbar and belt horsepowers of the five new models are as follows:

	DRAWBAR H.P.	BELT H.P.
RD-8	95	110
RD-7	61	70
RD-6	45	51
RD-4	35	41
Thirty (spark ignition)	35	41

The new RD-4 and Thirty are companions in outer dimensions, chassis, transmission and tracks. Many engine parts are also interchangeable. The new machines have higher ground clearance (11⅝") and less overall height (5' ⅝") than the old Thirty tractor. The Diesel weighs only 400 pounds more than the new Thirty and almost 300 pounds less than the old. This reduction in pounds per horsepower is considered a major achievement in Diesel tractor design.

The RD-4 consumes only 1¼ gallons of low cost fuel oil an hour. The old Thirty tractor burns about 4 gallons of gasoline per hour and its greatest speed is 3.6 miles per hour. The RD-4 and new Thirty have five speeds forward, fifth being 5.4 m.p.h. Drawbar pull for both (the Thirty burning gasoline) is as follows: First, 7,725 pounds; second, 5,475 pounds; third, 4,170 pounds; fourth, 3,195 pounds; fifth, 1,880 pounds; and reverse, 6,800 pounds. Speeds are 1.7, 2.4, 3.0, 3.7, 5.4 and 1.9 (reverse) m.p.h., respectively. Standard tread is 44" and for wide gauge models, 60".

High quality materials and workmanship have been maintained throughout, the announcement states. Cylinder liners are of heat-treated chrome nickel alloy iron cast in the company's foundry. Engine construction is similar to all past Diesel models manufactured by the company. Individual fuel pumps have been retained. The drawbar is pivoted farther forward than in former models, permitting more flexibility and added power on turns. Power take-off is from the lower shaft of the change gear set, but is mounted at standard S.A.E. height from the ground.

Except for addition of the new Thirty, no change in the company's line of gasoline tractors is announced. Present models are the Twenty-Two, Twenty-Eight, Forty, Fifty and Seventy.

Complete information regarding this new line of tractors may be had by writing the Caterpillar Company. Use one of the handy postcards bound in this issue.

Carbon Monoxide Indicator

MINE SAFETY Appliances Company, Pittsburgh, Pa., announces a portable instrument designed to indicate low concentrations of carbon monoxide in air in underground mines, truck cabs, garages, tunnels, excavating machinery cabs, in fact in any place where there is a internal combustion engine or furnace.

Experience has shown that a concentration of only .02 per cent (two parts in 10,000) may produce the characteristic primary symptoms of exposure to carbon monoxide; headache, mental dullness and physical logginess, in a few hours time. A concentration of .06 per cent may produce headache in less than an hour, and unconsciousness in two hours, while .10 per cent carbon monoxide may produce unconsciousness in a little more than an hour and prove fatal in four hours.

The indicator, a compact portable unit, is available with a self contained storage battery or for use with outside current. The meter is calibrated to read directly in percentage of carbon monoxide and has a scale range from 0 to .15 per cent graduated in hundredths of a per cent.

Heavy-Duty Dump Bodies

EASTON CAR & Construction Company, Easton, Pennsylvania, recently announced a line of heavy-duty rear-dump bodies for use in coal mines, quarries, and wherever heavy-duty hauling equipment is needed.

The Model GE-15 body is ruggedly constructed of 5/16-inch high carbon steel plate rigidly reinforced by four-inch H-beam body cradles which are supported by five-inch H-beam sills extending the full length of the body.

The floor of the body is of the sandwich type—the body bottom plates are covered with 2-inch oak planks and these in turn are armored with 5/16-inch steel wearing plates. The dimensions of the body are: length, 134 inches; width 97 inches; and depth 29½ inches.

The water level capacity of the standard body is 8 cubic yards, and when equipped with 14-inch side boards and the material heaped, the capacity is 16 yards. The body complete with a Commercial hoist weighs 9600 lbs.

This body has an automatic opening and closing tail gate. When the body is elevated, the gate automatically opens becoming flush with the floor when the body reaches an elevation of 16°. As the body continues to the fully dumped position the load slides out over the tail gate which acts as a chute. When the body is lowered to the carrying position the gate automatically closes.

Complete information regarding the equipment mentioned on this page may be had by writing the manufacturers. We will appreciate your mentioning EXCAVATING ENGINEER.

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The Business Situation

FOR THE first time in six years, business activity has had a normal seasonal increase in volume this autumn, and even something more than a normal increase. Since the bottom of the depression we have had a succession of upward movements in business, and one of them, following the bank crisis, was of exceptional volume and vigor. However, each was followed by a recession in which much of the ground gained was lost, and none of the previous periods of improvement had the convincing quality that characterizes this one.

The difference seems to be that the prevailing sentiment of business previously was one of tentative optimism, but this time is one of growing confidence. Probably the chief reason for this change is that business improvement this fall is well distributed over many parts of our economic life. The crops are better this year than they have been; retail trade has improved; there is more construction; industrial output is advancing; and there is an encouraging increase in the volume of railroad freight loadings.

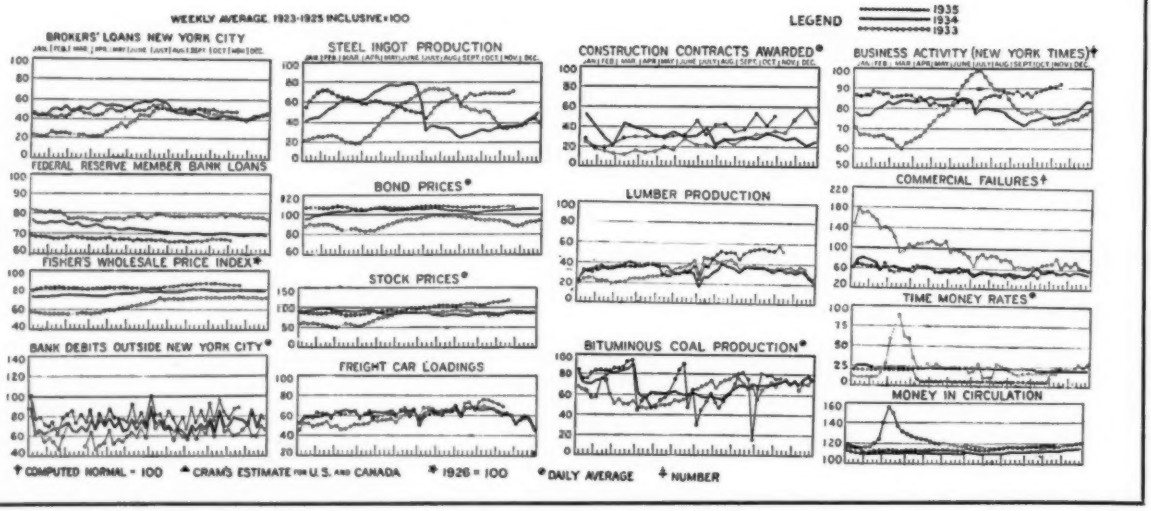
Analyzing the improvement in the construction industry, we find the marked increase due partly to private activity, and partly to the momentum of the WPA program. For October the volume of construction undertaken in the 37 eastern states totaled $200,863,700, according to F. W. Dodge Corporation. This was the highest monthly volume reported since December, 1933, which, incidentally, was the peak of the original PWA program. Excluding December, 1933, one must go back to the autumn of 1931 to find construction totals larger than that for this October. It compares with $167,376,200 for September and was almost 50 per cent greater than the $135,224,800 reported during October, 1934.

The residential total, as apart from other classifications, mounted to $55,100,300 in the 37 eastern states. This was more than twice the total of $26,299,800 for October of last year and represented a gain of more than 30 per cent over September, 1935. For the ten-month period ended October, residential building amounted to $394,007,800 as against $214,379,900 for the first ten months of 1934. Practically all of this 84 per cent gain was due to private building as distinguished from housing construction of public agencies.

Non-residential building awards during October in the 37 eastern states amounted to $59,448,400 as against $49,420,100 for September and $43,685,600 for October of last year. Heavy engineering jobs, embracing both public works and public utilities, amounted to $86,315,000 in October for the same area. This contrasts with $76,145,300 for September and $65,239,400 for October, 1934.

In addition to the changes for the better all along the line, there is a considerable and fairly general increase in the profits of many lines of business, and especially in manufacturing. This increase in profits appears to be considerably greater than the advance in the volumes of output and of trade and transportation according to the Cleveland Trust Company Business Bulletin. Apparently business has utilized the long depression period to effect economies and to perfect more efficient methods of operation so that now relatively small increases in volume produce much more than corresponding gains in profit margins.

WEEKLY BUSINESS INDICATORS



Our greatest present problem is still our huge volume of unemployment which has changed but little during the past two years, despite recent encouraging additions to industrial pay rolls. The chief direct and indirect causes for this condition are still the relative stagnation of our heavy industries and of construction. We still need such a solidifying of confidence as will impel men to undertake extensions of enterprise, assuming new risks in the hope of making new gains.

There is convincing evidence that the increase in business activity this fall has been both genuine and general. Perhaps the best testimony is to be found in the monthly report of the Federal Reserve Board which regularly publishes monthly figures on eight general indicators of business conditions. They include the volume of industrial production, mineral output, residential building, all other construction contracts, factory employment and wages, freight loadings, and department store sales. The report for September shows increases in all eight of these series. It is the first report this year in which all eight of the indexes advanced.

Recent revisions in the production index of the Federal Reserve Board have resulted in some changes in the index of industrial production. The new data show industrial output at 21.7 per cent below normal in July, 20.8 per cent in August, 19.9 per cent in September, and the estimated figure for October is 18.1 per cent below normal.

We'll See You at the 1936 Road Show

ONE OF THE surest signs that the road building industry is definitely on its way to new peaks is to be found in the hearty and enthusiastic acceptance of the Road Show and Convention to be held in Cleveland on January 20-24, 1936.

Early in October it became evident that exhibit space would be greatly over-subscribed, and that it would be necessary to engage considerable more exhibition room to supplement the spacious new Exhibition Hall. This was done by obtaining the adjacent Arcade and North Hall. Furthermore, hotel reservations at a very early date indicated that previous attendance records will be broken —even records that were set back in the so-called boom days.

The 1936 Road Show is called the "old fashioned" Road Show. This is probably because it intends to take up the good work of its worthy predecessors p. d. (pre-depression). It will be "old fashioned" in its enthusiasm and interest and looking forward to bigger days. Otherwise the 1936 Road Show will be as new-fashioned as the stream-lined models that greet the visitors in the great Exhibition Hall.

If the late depression did anything at all, it taught the lesson of economy. Street and highway builders who visit the Show will find that manufacturers have incorporated this principle of economy to an unprecedented degree in their new equipment. Models of new machines of all types will be especially noteworthy for their economy features. This means that 1936 road builders' equipment is designed to do better work at less cost.

And in addition to the sensational new models of machinery to be displayed, the convention itself will be replete with highly interesting activities for road builders—speeches on currently vital problems, banquets, get-togethers, and entertainments.

The 1936 Road Show has for its theme the continuation of an adequate highway program. Among the topics up for convention discussion are: Federal aid for the construction of roads and streets; use of highway revenues for highway purposes (no diversion of gasoline and motor vehicle taxes); use of established governmental administrative agencies; construction to be carried on under economically sound principles of the contract system; highway legislation; and highway safety.

It is hoped and believed that the show in Cleveland will mark the beginning of new activity all through the road building industry, and that the work accomplished at the show and the interest stirred up will result in a bigger and better year in 1936 than we have ever had.

Excavating Engineer salutes the 1936 American Road Builders' Association Convention and Road Show as a symbol and a hope!

The Question of Self Respect

IS IT THE WAGES or the work that gives a man back his self respect?

Our Government's present policy indicates that Washington favors the theory that it is the payday that counts. Setting aside all self interest, we believe that this is a fallacy.

It becomes more and more evident that much of the $4,800,000,000 appropriated to relieve unemployment is to be used for the sole purpose of creating pay checks. With limited hours and low wages those employed will largely receive mere sustenance pay. The majority of the relief projects come under the classification of boondoggling, and return little or no benefit to the public who must pay the bill. Certainly, with restrictions leaving no possibility of creating material industrial employment through purchases of supplies and equipment, the expenditures cannot be justified on the basis of priming the pump of industry. Neither are they likely, by transferring unemployed from relief to government payrolls at present WPA wage rates and hours, to raise the standard of living of those whose normal means of livelihood has been wiped out by the depression. And so we arrive at the inevitable conclusion that the only possible objective is to substitute the tax payers' pay check for relief from the same source.

The argument for the pay check under these circumstances seems to be that it gives the recipient back his "self respect."

You, who read Excavating Engineer, are accustomed to employing men and studying their reactions. Can you give a man self respect with "made work" and a pay check? It seems to us that the answer is emphatically "NO." Self respect comes with an honest wage honestly earned. Public money spent on leaf raking, dog counting, and other obviously useless jobs is wasted doubly. The work neither accomplishes any public good nor does it give any of those it employs "self respect."

SHOTS *from the Firing Line*

Additional Display Space Engaged for Road Show

WHEN the Joint Exhibit Committee of the American Road Builders' Association met in Cleveland on October 24 to allot space for the 1936 Road Show, they found that the number and size of applications for the Road Show were so great that it was necessary to provide an additional area for exhibit space. The Committee immediately engaged the Arcade and the North Hall to supplement the space available in the new exhibition hall.

Some of the interesting points brought out at the meeting on October 24 were:

The manufacturers have more real developments and improvements in equipment than at any previous Road Show.

The average amount of space per exhibitor exceeds the amount of space used at previous Road Shows.

At least four pieces of equipment to be exhibited will weigh 20,000 lbs. more than the heaviest piece ever exhibited before.

An exceptionally large attendance is already assured. Hotel reservations have been and are being made in large numbers by members of all branches of the highway industry and profession—to date the reservations indicate a keen interest from all sections of the country.

Giant Stripper Now Working in Indiana

The Binkley Coal Company of Terre Haute, Indiana, has put into service this past month a new giant Bucyrus-Erie 950-B power shovel that for size, reach, and digging ability exceeds anything the world has ever seen.

The mammoth new shovel has a 30-yard dipper, a boom 105 feet long, a dipper stick 64 feet long, a dumping radius of 106 feet, and a maximum dumping height of 70 feet. Compared, for example, with the popular 10-B ⅝-yard shovel, the smallest in the Bucyrus-Erie line of excavators, the new giant has an actual dipper capacity equal to approximately eighty such shovels.

The building of such a huge machine has been made possible through many new and unique engineering developments by the Bucyrus-Erie Company. Until 1928 when Bucyrus-Erie introduced the 750-B, 8-yard strippers were the largest shovels available. The 750-B was originally introduced as a 12-yard machine and was, at the time the first of these machines built, the largest in the world. In 1929 due to further developments, the first 16-yard machine

was built by Bucyrus-Erie, and in 1930 the introduction of the counter-balanced hoist permitted the increase of dipper size to 18 cubic yards and finally to 22 cubic yards. The new 950-B is more than a third larger in dipper capacity than this previous largest stripper and combines this big dipper with increased reach, speed, and convenience.

Electrically operated throughout, thirty-two different motors take care of the various functions of moving, leveling, digging, and dumping. There are hoist motors, swing motors, traction motors, crowd, leveling, and cable reel motors, air compressor and blower motors, boom hoist, deck winch, and overhead crane motors, and a main motor of 1000 H. P. driving four main generators.

Some of the other outstanding features of the machine are: four individual motor-driven tractors each weighing 60 tons; hydraulic steering; automatic hydraulic leveling that saves output time by leveling the huge machine while it is digging; new type boom and tubular dipper handle that permit greater length, larger dipper and load, and longer swing range without an increase in weight; Bucyrus-Erie counter-balanced hoist allowing highest power efficiency on actual digging work; and field convertibility either as shovel or dragline.

The new 950-B giant has already begun its work of coal stripping at the Binkley mines near Seelyville, Indiana. Large coal operators have stated that the low-cost production possibilities of the machine may soon make its use general for development of many open-pit coal mines which formerly could not be worked under the current market prices of coal.

Aggregate Associations' Convention to Be Held Next Month

THE ANNUAL conventions of the National Sand & Gravel Association, the National Crushed Stone Association, the National Slag Association, and the National Ready-Mixed Concrete Association will be held concurrently from January 27 to 30, 1936, in St. Louis. Headquarters will be the Jefferson Hotel. The program will be dedicated to a review of business conditions in 1935 and prospects for 1936. Problems of intense interest will be discussed by outstanding speakers. Convention features include a joint exposition of machinery and equipment used in these allied industries.

Sidewalks for Pedestrians

AN EIGHT MILLION dollar Federal-State project to construct nearly 1,000 miles of asphalt sidewalks along state highways in Massachusetts has been approved by Federal and state officials. The plan is for the WPA to grade the sidewalks and provide the gravel, while the state will construct the curbstone and surfacing. The sidewalks are to be of four- and six-foot widths.

The completion of this program in Massachusetts is expected to result in a large decrease in number of accidents

MOVES MORE DIRT *per hour··per dollar of cost*

Digging to Heaped Capacity

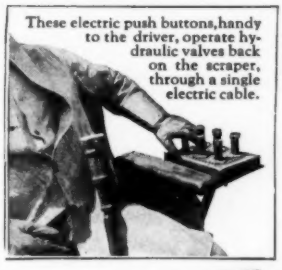
With the front gate partly lowered a ribbon of material enters the pan smoothly and swiftly. Although rated at 12 yards, the 12½ yard load shown here is the rule rather than the exception.

Lifting and Carrying

The loaded pan is lifted hydraulically without demands for power on the tractor. A separate engine on the scraper provides the hydraulic power. When lifted the lowest point of the unit has 11½ inch road clearance.

Dumping and Spreading

Following up on that part of the load which dumps by gravity, a powerful push-out door clears the pan completely. This operation is also hydraulic and like the lift is actuated by remote magnetic control from the tractor cab. (See below.) Only an electric cable and the draft pin connect the tractor and scraper, but positive remote control is assured.



These electric push buttons, handy to the driver, operate hydraulic valves back on the scraper, through a single electric cable.

● The full 12-yard capacity of the new Austin-Western Hydraulic Scraper suggests that in size alone this unit will dig, load, haul and dump at a high rate per hour. But this is only the most obvious advantage. Actually this scraper will handle one 12-yard load faster than other units can perform the complete cycle of operations for even a smaller load.

Why? Special alloy steels provide light weight without sacrifice of strength. Hydraulically controlled with a separate engine mounted on the scraper, but operated from the tractor by remote magnetic control. Properly designed pan for quick and easy loading and unloading. Hydraulic push-out door completes the dumping operation quickly and easily.

The result is outstanding performance—handling all materials from sand to decomposed rock—cutting to a depth of 6 inches and spreading anything from a thin layer to a depth of 2 feet. Write for full details.

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suffered by pedestrians while walking on or along the highway.

While Massachusetts at the present time is the only state engaged in such a large highway-sidewalk project, it is reported that many other states, aroused by figures showing that 15,950 pedestrians throughout the country were killed by automobiles last year —with 2,690 pedestrian deaths on rural highways, are planning similar WPA projects.

Highway Progress Report for November

OFFICIAL REPORTS of the United States Bureau of Public Roads show that highway projects have been approved in 41 states.

The Bureau also reports that grade crossing projects have been approved in 35 states.

The Works Progress Administration has approved farm-to-market road projects totaling more than $200,000,000.

Municipal street projects totaling approximately $185,000,000 have been approved by the WPA.

Farm-to-market road projects under WPA are expected to exceed $300,000,000. No official estimate has been made of the contemplated total of municipal street projects.

A total fund in excess of a billion dollars is available for highways, streets and grade crossings for the current fiscal year.

Of this total, $200,000,000 is allotted to grade crossings and an equal amount to highways from the Emergency Relief Appropriation of 1935, while $125,000,000 is available in regular Federal-Aid, this to be matched by the States, making a total of $650,000,000 that is being expended by the contract method on State programs approved by the Bureau of Public Roads.

Foreign Notes

New Guinea

The March 1935 issue of Excavating Engineer presented an article which describes how the **Bulolo Gold Dredging Limited** found it economical to use airplanes for transporting mining machinery from the seaport of Lae inland to their gold deposit on Edie Creek. In addition to flying in four large placer dredges, electrical machinery for a complete hydro-electric plant, and other mining equipment, the company later found need of a power shovel for digging ditches and other excavation work. The machine purchased was a Ruston-Bucyrus 21-B which upon its arrival at the seaport was flown in a piece at a time. Since the publication of this article, we have received an interesting letter and a number of photographs from the shovel operator, Thomas T. Reynolds. We reproduce on this page three of the photographs. The top illustration shows Mr. Reynolds at the levers of the 21-B loading gravel to a motor lorry. No doubt the gravel is being taken from one of the spoil banks behind one of the four dredges and is being used on roads or for making concrete. Operator Reynolds states: "This is the first motor lorry to be loaded by mechanical means in the territory." The illustration in the center shows the shovel moving through a ditch which it has just completed while in front of it a gang of native boys put down timbers on the soft ditch bottom to support the machine. Numerous ditches are necessary to convey water to the dredging ponds where the big placer dredges work. The bottom picture shows a water reservoir with the excavation completed and practically ready for use.

Atlantic-Gulf Ship Canal

According to reports received from Florida, **Badgett Construction Company**, Memphis contractors, had the honor of taking out the first bucketful of dirt with a power excavator. This company holding contracts for items 6 and 7, totaling 1,193,000 yards, near Santos, Florida, started work November 4 with a Bucyrus-Erie 43-B Diesel-powered dragline.

Other contractors on this project are moving in their equipment as rapidly as possible and dirt will soon be moving in a big way during the winter.

BUCYRUS-MONIGHAN Walking Draglines are available with long booms and large buckets which enable them to complete wide sections without moving. But their capacity for making wide excavations or embankments is not limited by boom length. They can finish an additional width of 50% or more from the same side of the work because they can back off directly at right angles or at any angle to an excavation or embankment. This often saves the time otherwise lost in "doubling back" to complete the job.

Ask for complete details on these fast-digging big-profit machines. Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.

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Shots From the Firing Line—*Continued*

North Carolina Notes

Gregory-Chandler Company, Virgilina, Virginia, recently completed a grade separation project at Marsden. The illustration above shows their Bucyrus-Erie 10-B crane driving 20-foot piles on this job. The machine, equipped with a 28-foot boom, lifts a pile, leads, drop hammer, and follow block weighing approximately 5,000 pounds, working at a 15-foot radius. The approaches required 40,000 yards of fill which was handled by the 10-B and a GA-2 shovel.

Ohio Notes

By H. F. UNGER

George A. Fuller Company of Washington was awarded a contract for the construction of the $3,650,000 Outhwaite low-cost housing project in Cleveland. It is expected actual construction will get started at once. This company also has the Cedar-Central project well on its way.

FRANK C. FORSCHNER

Frank C. Forschner, 67, contractor, died at the home of his son, Francis, in Cleveland. He was engaged in the contracting business for forty years, and helped organize the Forschner Company. He is survived by two sons, Francis J. and Irvin A., two sisters, and three brothers.

Wm. Eisenberg & Sons, Inc., Camden, New Jersey, are well along with the construction of Beach City Dam across Sugar Creek near Beach City. This is one of fourteen dams under construction by the Muskingum Valley Conservancy District as a flood control measure in southeastern Ohio. The construction of this earth-fill $843,500 dam involves approximately 475,000 yards of common excavation and 146,000 yards of rock excavation. The contractor uses a Bucyrus-Erie 37-B shovel, shown below, loading to 14-yard Athey side dump quarry trailers pulled by Caterpillar Diesel 75s.

Minnesota Notes

Launching an extensive construction program, the State Highway Department since October 1 has called for bids on more than 175 miles of low cost improvement on its secondary system, according to recent announcements from the department. Designed to furnish maximum man-hours of employment consistent with worth-while improvement and financed to a large extent from Minnesota's $5,000,000 allotment of Federal works progress funds, the program, as announced to date, calls for the construction of more than 115 miles of stabilized gravel base course, 47 miles of grading and 13 miles of ordinary gravel. Further lettings scheduled at two-week intervals include additional mileage not listed in this tabulation.

Illinois Notes

By A. J. KOENIG

Approval of expenditures of $1,972,000 for **grade separation projects** in St. Clair County has been given by President Roosevelt, according to word received by County Superintendent B. C. McCurdy. The program includes nine projects throughout the county, the largest being the expenditure of $459,000 for two underpasses beneath the B. & O. and L. & N. railroads at St. Clair Avenue in East St. Louis. An underpass at Second and St. Clair Avenue beneath the tracks of the Pennsylvania Railroad will cost about $400,000. Three other eliminations will be

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If you are interested in the correct selection of permissible explosives, read the booklet, **Hercules Permissibles,** which describes the characteristics of the Hercules simplified list of 10 permissibles.

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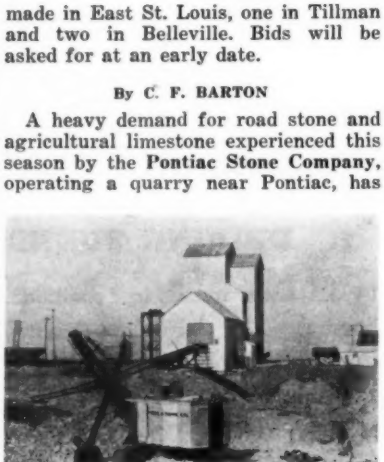
Shots From the Firing Line— *Continued*

made in East St. Louis, one in Tillman and two in Belleville. Bids will be asked for at an early date.

By C. F. BARTON

A heavy demand for road stone and agricultural limestone experienced this season by the **Pontiac Stone Company**, operating a quarry near Pontiac, has



been met by the addition of a Bucyrus-Erie Gas-Air shovel. With a crushing plant equipped to load directly to cars or to trucks the company now obtains an output of 800 tons per ten-hour day.

St. Louis and Vicinity

By A. J. KOENIG

Fruin-Colnon Contracting Company submitted low bid of $353,510 for the construction of the Arsenal Relief Sewer. The sewer, 10 feet in diameter, will be bored through solid rock for the most of its length. It begins at the Mississippi River at the foot of President Street, and will be built westwardly to Texas Avenue.

Federal funds have been used to advantage in **flood prevention work** in East St. Louis. This construction scene shows the new pumping station under construction on Cahokia Creek. The impounded waters of the creek will be pumped into the Mississippi River when the latter is at flood stage and as a result the flood water from the river will no longer back up the creek. The Public Works Administration allotted $2,360,000 for this project.

The Missouri State Highway Commission, on October 25 received 291 bids from contractors to construct 267 miles of roadway at an **estimated cost of $1,630,500.** Projects let include the construction of 3.4 miles of concrete pavement, 234 miles of gravel, and 13.3 miles of graded earth.

The Board of Public Service will take bids December 6th on **the railroad approaches** to the Municipal bridge financed by the $800,000 bond issue voted recently.

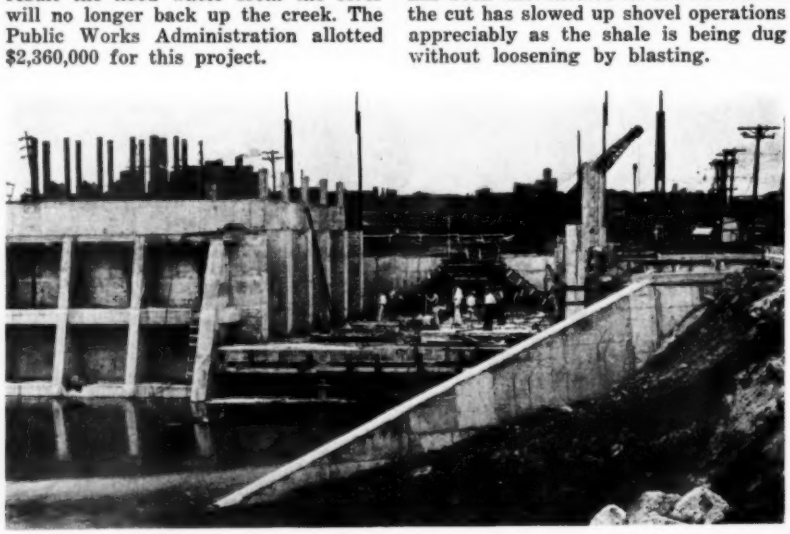
Fort Peck Dam Notes

With the arrival of winter weather the **Government** dredges were ordered into their quarters at the winter harbor. Orders were issued on October 31 to tie up all dredging plants. In spite of the late start last spring and the early tie-up this fall, there are now 21,750,000 yards of fill in the dam. Altogether, toe gravel, hydraulic fill, and boulders bring the total to nearly 25-,000,000 yards in place. Over 3,631,000 yards were pumped into the dam during October. Dredges, boosters, and pipe lines will be thoroughly overhauled and put in shape for next year's work.

Mason-Walsh Company are continuing their enlargement operations in the diversion tunnels and are making good progress in spite of the difficulties encountered.

Morrison-Knudsen Company have finished the rough grade for the five-mile extension on the spillway railroad down to the dam. They are now placing ties and hand rails on the trestle portion of the work and spreading ballast for the tracks on the upper portion. Up to November 15, about one and one-half miles of track had been ballasted.

Spillway Builders, Inc. (Massman Construction Company) using only their own trucks, moved an average of 20,-000 yards per day during the first week of November. The firm shale which has been encountered in the bottom of the cut has slowed up shovel operations appreciably as the shale is being dug without loosening by blasting.



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New Mexico Notes

The State Highway Department recently announced the following awards: **Skousen Brothers**, Albuquerque, 16.5 miles of grading and surfacing in Bernalillo & Valencia Counties for $37,274; **Cook & Ransom**, Ottawa, Kansas, 5.6 miles of surfacing in Sierra County, $35,636, and road project FAP 179-A for $143,920; **Walter H. Denison**, Roswell, 7.5 miles of grading and culverts in Otero County for $78,186, and road project FAP 97-E for $144,994; and **New Mexico Construction Company**, Albuquerque, 10.6 miles of surfacing in Bernalillo County for $139,394.

E. W. Everly, Albuquerque, is working on a highway project near Gallup and the Hopi Indian Reservation. The work involves approximately 120,000 yards of excavation, quite a bit of which is rock. His Bucyrus-Erie 21-B shovel, Diesel-powered, shown in the illustration to the right, makes good progress through the tough going.

Washington Notes

An allotment of $4,000,000 to the Bureau of Reclamation, for completion of the Roza division of the Yakima Reclamation project was announced recently. This allotment will provide for the construction of a diversion dam, 99 miles of main canal, tunnels, siphons, 500 miles of laterals, and a 12,000-kilowatt hydro-electric unit. The purpose of the work is to provide a gravity water supply to 11,000 acres included in 552 farms which now are being supplied with water pumped at excessive cost from the Sunnyside canal. It also will irrigate 72,000 additional acres of some of the best land in the rich Yakima Valley.

Oregon Notes

The State Highway Commission recently announced the following awards: **McNutt Bros.**, Eugene, 3.43 miles of grading on the Old Oregon Trail in Baker County for $101,898; **Jacobsen-Jensen Co.**, Portland, 1.68 miles of grading and paving on the Pacific Highway in Douglas County for $119,296; **Oregon Contracting Company**, and **Theo. Arenz**, Portland, 7.85 miles of grading and surfacing on the John Day Highway in Grant County for $85,885; **Babler Bros.**, Portland, 1.23 miles of grading, 14.6 miles of grade widening, and 16 miles of surfacing on the Fremont Highway in Lake County for $107,952; **Myers & Goulter**, Seattle, 1.15 miles of grading on the Santiam Highway in Linn County for $108,165; and **Parker-Schram Co.**, Portland, the construction of a concrete and steel bridge over the O. W. R. R. & N.

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Co. tracks and the grading and surfacing on 1.19 miles of highway on the Big Edy Overcrossing Section of the Columbia River Highway in Wasco County, for $142,371.

Nevada Notes

By H. L. LIVINGSTON

The following contracts have been awarded by the Highway Commission: **Fredrickson & Watson Construction Company, Fredrickson Bros.** and **Jones & King**, Reno, $219,669 for 15.13 miles of gravel surfacing in Clark County; **Gibbons & Reed**, Salt Lake City, Utah, $65,425 for 5.72 miles grading and surfacing in Clark County; **Isbell Construction Co.**, Reno, $116,700 for 4.45 miles gravel surfacing in Washoe County; **Dodge Bros. Inc.**, Fallon, $123,532 for 11.69 miles surfacing in Churchill County, $30,790 for constructing an underpass in Lyon County and $86,755 for constructing an overpass in Eureka County.

California Notes

By H. L. LIVINGSTON

The following contracts have been awarded by the California Division of Highways: **Hanrahan Wilcox Company**, San Francisco, $247,253 for 4 miles grading and paving in Alameda County; **Oswald Bros.**, Los Angeles, $39,898 for 3.2 miles surfacing in Imperial County; **Basich Bros.**, Los Angeles, $30,430 for .7 miles grading in San Diego County; **C. O. Sparks**, Los Angeles, $116,866 for 3.5 miles grading and paving in Los Angeles County; **J. F. Knapp**, Oakland, $359,932 for constructing an undergrade crossing in Alameda County; **Southern California Roads Company**, Los Angeles, $43,404 for 1.5 miles grading and paving in Kings County.

The U. S. Engineers Office, Sacramento, have awarded a contract to **D. McDonald**, Sacramento, for $92,020 for raising and strengthening the levees along the southern bank of the American River for a distance of 6.3 miles.

The Metropolitan Water District, Los Angeles, has awarded the following contracts: **American Concrete & Steel Pipe Co.**, Southgate, $1,968,633 for the construction of pre-cast concrete pipe between Stations 926-0 to 1185-40, and between Stations 1185-40 and 1436-00, and **United Concrete Pipe Co.**, Los Angeles, $1,127,786 for the construction of pre-cast concrete pipe between Stations 2009-18 and 2257-50. These contracts take in Schedules 4 and 5-P and 8-P. All other bids received on Schedules 6-C, P, 7-C and P have been rejected and will be readvertised.

The Bureau of Public Roads, San Francisco, will call for bids in the spring for three large grading contracts in the Yosemite National Park. These are:

1.—5.8 miles grading on the Big Oak Flat Road

2.—5.5 miles grading on the Tioga Road

3.—Construction approaches on the South Fork of the Tuolumne River.

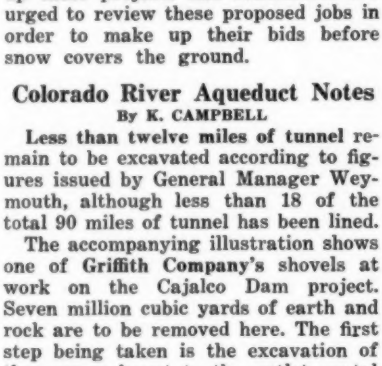
The approach of winter has held up these projects and contractors are urged to review these proposed jobs in order to make up their bids before snow covers the ground.

Colorado River Aqueduct Notes

By K. CAMPBELL

Less than twelve miles of tunnel remain to be excavated according to figures issued by General Manager Weymouth, although less than 18 of the total 90 miles of tunnel has been lined.

The accompanying illustration shows one of **Griffith Company's** shovels at work on the Cajalco Dam project. Seven million cubic yards of earth and rock are to be removed here. The first step being taken is the excavation of the approach cut to the outlet portal of the diversion tunnel which will carry



Cajalco Canyon's water run-off around the damsite while the structure is being built. Approximately a half mile long and 185 feet high, Cajalco Dam will be of earth-fill construction and will form a reservoir with a capacity of 100,000 acre feet of water.

Rapid progress in being made by **Six Companies, Inc.**, in the excavation of the diversion tunnels of Parker Dam shown above. Measuring 29 feet in diameter and 1600 feet in length, the two huge tunnels will control the flow of the Colorado River around the dam site during its construction.

L. E. Dixon, Bent Brothers and Johnson expect to complete excavation next month on the Pasadena tunnel, having drilled through 12,139 feet

from the West portal, shown above, and having completed about one-third the distance from the East portal.

The West Construction Company, despite a serious water handicap, have completed excavation of more than half of the 7865-foot Monrovia No. 1 tunnel; and over one-third of Monrovia No. 2.

Less than a thousand feet remain to be driven on the Whipple Mountain tunnel being drilled by the **Walsh Construction Company**. The length of the bore is 32,365 feet. It is located at the eastern end of the Aqueduct.

Southern California Notes

By K. CAMPBELL

According to H. Gunther, of **Gunther and Shirley**, co-contractors with **W. E. Callahan Construction Company** on the All-American Canal, their work is one-third finished. Up to November 1, they have moved approximately 12,600,000 cubic yards of dirt on their six schedules.

The Standard Dredging Company, San Francisco, has nearly completed its contract for dredging in Newport Harbor. The dredged material has been pumped across Balboa Peninsula and deposited on the ocean side, widening the beach approximately 300 feet for a distance of about 4 miles. Quantities involved in the contract are 8,127,000 cubic yards of common excavation and 6,480 cubic yards of ledge rock.

The U. S. government has approved a project to increase the depth of the harbor entrance channel and turning basin in the outer harbor of San Pedro to forty feet, so that the largest vessels calling at the port, including battleships and liners, may be accommodated. This project will require the removal of approximately **4,000,000 cubic yards of bottom soil**, at a cost of between $600,000 and $800,000. The Harbor department of the city of Los Angeles will remove 400,000 cubic yards of soil in a supplementary dredging project between pierhead lines from the entrance to the east channel to the full width of the channel fronting municipal pier No. 1.

Trade Notes

F. C. Crane Company of Dallas, Texas, has announced the removal of their office and warehouse from 1301 South Lamar to 3120 Grand Avenue. Larger quarters at the new address will permit Crane Company to carry a larger stock of supplies and machinery.

The Chain Belt Company, Milwaukee, Wisconsin, has recently announced the appointment of the **J. D. Pittman Tractor Company,** 520 North 28th Street, Birmingham, Alabama, as its exclusive distributor of Rex construction equipment in the Birmingham area. The new distributor, well known in the construction machinery industry, handles a complete line of contractors' equipment and will stock late models of Rex mixers and pumps.

Book Reviews

Safety Devices—Mine Safety Appliances Company, Pittsburgh, Pa., has just published a new bulletin describing their complete line of industrial protective hats — "Skullgards." These protective hats have not only obtained great popularity among mine workers but are finding widespread usage in the construction field and pit and quarry operations. A copy of bulletin DK-3 may be had by writing the manufacturer.

Manganese Welding — Stulz-Sickles Company, 142 Lafayette Street, Newark, N. J., has recently issued a pamphlet covering the use and application of nickel manganese steel welding electrodes. In addition to welding and building up all worn down and broken 11 to 14 per cent manganese castings, any steel surface subject to severe impact and abrasion can be given a manganese steel armor by welding on a protective coating. The pamphlet also covers the use of manganal applicator (filler) bars and wedge bars. A copy may be had upon application.

Pipe Joints—A new booklet on pipe joints, intended for those who have occasion to construct, operate, or maintain water lines, has recently been published by the **S. R. Dresser Manufacturing Company,** of Bradford, Pa. This 16-page booklet contains detailed descriptions of a number of various pipe line products. It may be had free by writing for Form 355.

Compressed Air—A new bulletin illustrating the various types of aftercoolers made by **Ingersoll-Rand** is now being distributed. It explains the reasons why aftercoolers are needed, and how the different types of aftercoolers fit into certain compressor plant conditions. Bulletin No. 9212 can be obtained from Ingersoll-Rand, 11 Broadway, New York.

Protect Your Home from Tuberculosis
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Diesel Locomotives—A 16-page bulletin has recently been published by the **Ruth Company,** Denver, Colorado, describing in detail the Ruth Diesel locomotive which is designed particularly for underground service and for surface hauling where an economical operating unit is desired. The book is well illustrated and shows the construction features of the locomotive. A copy may be had by writing the manufacturer.

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Wheeler Dam Nears Completion

(Continued from page 558)

● *The construction of Wheeler Dam is featured by the use of floating concrete mixing plants, one of which may be seen over the rock wall of the second cofferdam. To the right is the long-boom gantry crane swinging a bucket of concrete from the mixing plant to the forms. The gantry crane runs on tracks laid on top of the rock wall.*

The Ohio River type, being durable, was decided best. Two lines of heavy, wooden sheathing, spaced twenty feet apart, were installed. The lines were held in place with walers and tie rods. The space between was filled with gumbo dredged from the north river bank. This material was loaded on barges, towed across the river to the south side, and unloaded into the space between the sheathing-walls with clam shells operated from derrick boats.

The second cofferdam was of the rock-fill type in which was used the rock excavated in the power house area in cofferdam number one. To make this cofferdam water tight, a thick clay blanket was placed around the river side of the rock fill, and the whole was protected from wave action and erosion by a line of wooden sheathing. An idea of the work entailed in the construction of a cofferdam of this size and type may be gained from the fact that 50,000 yards of rock and 35,000 yards of clay were used in number two.

As a result of their experience with these two types of cofferdams, TVA engineers decided on the Ohio River type for cofferdams number 3, 4, and 5.

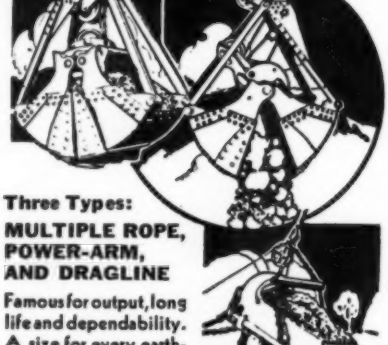
Rock Excavation Handled by Electric Shovels

After unwatering the cofferdams the river bed was found to be practically free of overburden except in scattered pockets. This was undoubtedly due to the fineness of the silt, its suspension and the velocity of the stream. Two electric shovels, a Bucyrus-Erie and Marion, both 2½-yard capacity, were put to work at once on the rotten rock in the upper strata of the river bed.

With the preliminary excavation out of the way, the power shovels were soon in the heavy rock excavation. Of an estimated total of 570,000 yards, about half that amount was removed from the power house cofferdam. Number 2 yielded about 81,000 cubic yards, number 3 nearly the same, and 4 and 5 will require the excavation of about 40,500 and 20,000 cubic yards respectively.

Line Drilling Extensively Used

In the deep cuts in the power house site and the shallow cuts in the other cofferdams, an ex-



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tensive system of line drilling was developed and used. This method of drilling eliminated to a great extent overbreak with a corresponding saving in concrete, and made unnecessary any blasting near the face of the cuts.

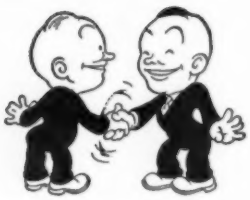
A number of Ingersoll-Rand wagon drills put down 2⅞-inch holes on 4½-inch centers to a depth of 15 feet along the face. Additional blast holes were drilled in the rock to be broken out, but no hole was closer than 30 feet to the line drilling.

In the power house cut where it was necessary to take out several lifts, the drills were inclined sufficiently to secure clearance against the rock. The finished face, as a result, had a series of narrow steps in it with the top and bottom in a vertical line.

Good drilling methods and careful loading of holes, resulted in good fragmentation of the rock. Occasionally gases from explosions sometimes penetrated porous seams and lifted up slabs of tight rock ranging in size up to 15′ wide and 25′ long. Blockholing reduced these to shovel size. However, comparatively little of this was required.

The shovels load to 10-yard end dump type White and Hug trucks. They are pneumatic-tired, ten wheelers, with the pay load over eight wheels. Spoil was used largely at first for foundations of work shacks erected along the river bank as well as supply roads and parking places. As the work extended farther out into the river, the spoil was dumped fanwise in areas out of the navigation channel, both above and below the dam. Some of it was used to fill marshes at the head of Wilson Lake. Spoil banks in the

● *The Wiley Whirley helps load the big rocks into the skips. It then hoists the skips and dumps them into trucks up on the bank. The rock-fill type of construction used on cofferdam No. 2 is shown clearly here.*



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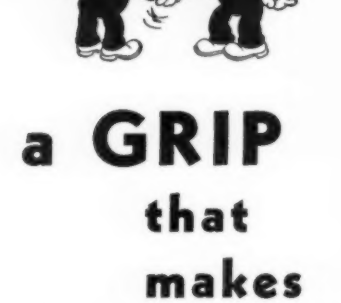
makes
FRIENDS



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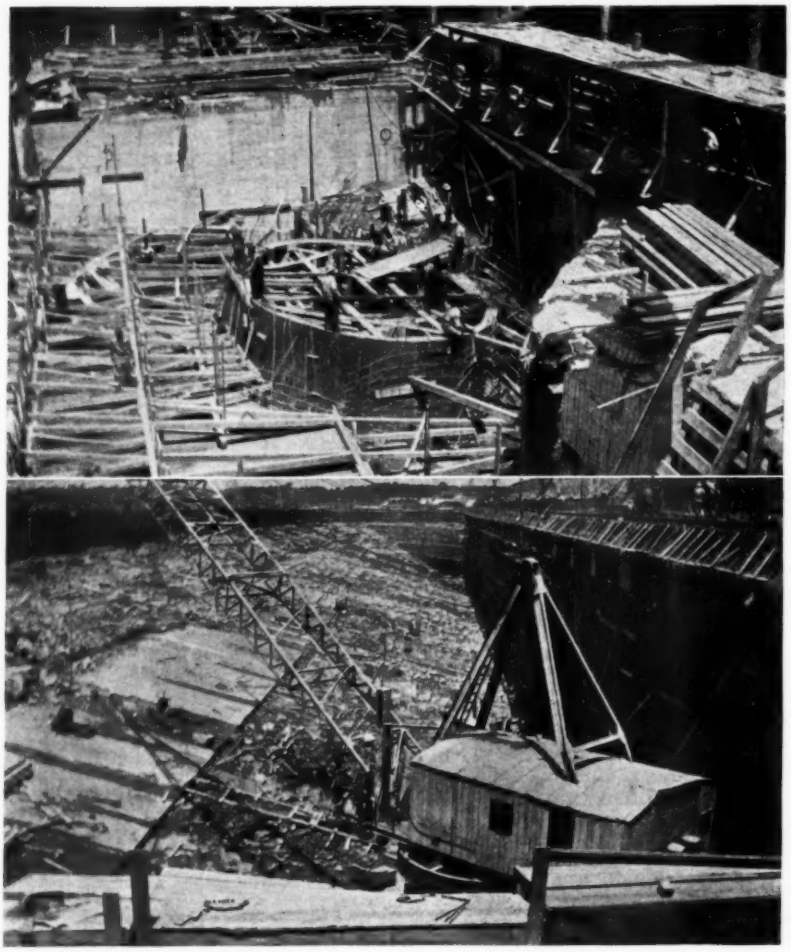

● *Top: A view of the turbine pit where workmen are setting up forms for the concrete discharge tube from the turbines. Below: The water, after leaving the turbines, will strike the upward slope of the tailrace which is designed to check the destructive force of the discharged water.*

river provided excellent breakwaters during floods and storms. One of these banks, just below the dam about midstream, was levelled out as a work area. Blacksmith and machine shops, warehouses and a large air compressor unit have been located here. The trucks with heavy loads, made hauls varying in length as the work progressed and up grades of from 13% to 15%. In addition, a fleet of dredges and barges were kept busy.

The power house excavation was carried down from 50′ to 57′ below the river bed. The floor of the pit curves upward in the tail race in such a manner as to break the force of the water from the turbines.

Rock Deteriorates Quickly Upon Exposure to Air

The unusual nature of the rock in the foundation area requires special care in excavating. As Mr. W. M. Hall, Construction Engineer, wrote in a paper for the American Society of Civil Engineers recently: "This rock is composed of several types of common limestone, which lies in strata varying from a coarse crystalline formation to a compact, hard-grained siliceous composition." When exposed to the weather it slacks quickly. Excavation is, therefore, carried down to within about one foot of finish grade and then no more is taken off until ready for concreting. At that time the remaining foot is removed with wedges, plugs and feathers, paving breakers or other suitable means. The con-

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crete is then poured immediately upon the fresh, undisturbed rock before deterioration sets in.

Supplies Brought in by Water

The aggregates for the concrete are dredged from sand bars 35 to 50 miles downstream from the damsite by the Cumberland River Sand Company of Nashville—using one of the largest ladder-type dredges in the United States. It has a capacity of 450 tons per hour. The material is washed, put through Robbins vibrating screens, and separated into four sizes, three of gravel and one of sand.

To move the materials to the site as needed requires six towboats and fifty-five 700-ton barges. The chief difficulty met with in this method of transportation is the temperamental nature of the river. The channel is so shallow in places that the barges sometimes strike bottom, and at other points the current is very swift. At Buck Island Chute, for example, it attains a velocity of five to six miles per hour, and it is necessary to tow the bargetrain up the half-mile stretch. For this purpose one end of a tow line has been anchored in the river bed. The other end is attached to the drum of a hoist mounted on a specially fitted barge. The barges are then coupled on and pulled up the Chute. In spite of such difficulties including the movement through locks, one of which is small, the contractor has maintained an adequate flow of materials, most of which moves direct to the mixing plants.

The mixing equipment is mounted on barges and moored at convenient points along the dam. Specially built by Blaw-Knox, Pittsburgh, the weighing and batching devices work accurately regardless of the listing of the barge, when the serving cranes, Americans, swing about with loads. The concrete is transferred from mixers to the dam in 2-yard buckets handled by Clyde Wiley Whirlers.

A. E. Morgan is Chairman and Chief Engineer of the Tennessee Valley Authority with C. A. Bock as Assistant Chief Engineer. At Wheeler Dam, Wilfred M. Hall is Construction Engineer, and George P. Jessup, Construction Superintendent. Before coming to Wheeler, Mr. Hall was in charge of the Jerry O'Connell Dam, which was built in the State of Bahia, Brazil, by the American and Foreign Power Company. Mr. Jessup will be remembered for his outstanding work on the Osage project at Bagnell, Missouri. Joseph Gilbert is Field Engineer, and "Bill" Winters, Rock Excavation Foreman. Bill has a perfect no-accident record so far on this job despite the huge quantities of explosives used, the amount of material brought out, and the fact that 5,000 men working on the structure are potential casualties.

Evidently when Bill toots a series of sharp, staccato warnings with his compressed air siren, he means for everybody to take to cover, and, as the philosophical negro laborers say, "stay kivvered 'til de lead rock lights!"

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1 1 CU. YD. DIPPER—26' boom, 17' handle Shovel equipment—Will fit 30-B. SE-35.

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1½ CU. YD. DIPPER—27' BOOM——17' DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable only for Bucyrus-Erie 43-B machines. Rebuilt—New Machine Guarantee. SE-23.

1 1¾ CU. YD. DIPPER, 30' boom, 19' handle, high lift shovel equipment—Will fit 50-B. New. SE-33.

1 1¾ CU. YD. DIPPER, 22' boom, 16' handle, shovel equipment—Will fit 43-B. New. SE-34.

Skimmer Scoop

⅝ CU. YD. DIPPER—20' Boom together with all necessary ropes and material to completely convert Bucyrus-Erie 1020 Shovel, Clamshell or Dragline to Skimmer Scoop Machine. NEW. Shipment 2 to 3 weeks. SS-1.

Dragline Equipment

35' CHANNEL BOOM, FAIRLEAD AND ROPES but not including bucket. For use on Model D-2—20-B—31-B. NEW. DL-2.

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2—20-B—31-B. NEW. DL-3.

BRAND NEW Ropes included with each of above Dragline Equipments.

Trench Digging Equipment

1 CU. YD. 42½" WIDE—Solid type Dipper—24' Boom and all auxiliary equipment. Will dig maximum depth 22'. For application to GA-2 or GA-3 Shovel. Rebuilt—New Machine Guarantee. DS-5.

BRAND NEW PAGE, two dippers each ¾ cu. yd., one 38" wide over cutters, the other 49½" wide over cutters. 17'1½" Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030 or 1035. DS-7.

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1—24' D-2 DRAG SHOVEL BOOM—New. JA-1.
4—18' 20-B STEAM SHOVEL BOOMS—New. JA-2.
1—18' 31-B STEAM SHOVEL BOOM—New. JA-3.
2—20'6" 20-B STEAM SHOVEL BOOM—New. JA-4.
1—21'9" 31-B STEAM SHOVEL BOOM—New. JA-5.
1—22'6" GA-2 or GA-3 SHOVEL BOOM—New. JA-6.
3—23' 20-B DIESEL, GAS OR ELECTRIC SHOVEL BOOM—New. JA-7.
1—24' GA-2 or GA-3 SHOVEL BOOM—New. JA-8.
2—24' 43-B ROPE CROWD SHOVEL BOOM—New. JA-9.
1—25'9" 30-B DIESEL SHOVEL BOOM—New. JA-10.
1—26' 20-B DIESEL SHOVEL BOOM—New. JA-11.
1—26' 30-B STEAM SHOVEL BOOM—New. JA-12.
2—26' D-2 SHOVEL BOOM—New. JA-13.
1—26' D-2 SHOVEL BOOM—Used. JA-14.
1—26' 50-B STEAM SHOVEL BOOM—New. JA-15
3—27' 43-B ROPE CROWD SHOVEL BOOM—New. JA-16.
1—30' 50-B ELECTRIC SHOVEL BOOM—New. JA-17.
3—30' 50-B STEAM SHOVEL BOOM—New. JA-18.
1—35' D-2 DRAGLINE BOOM—New. JA-19.
1—40' 20-B, 31-B and D-2 DRAGLINE BOOM—Used. JA-20.
1—45' 30-B, E-2, 41-B and 42-B DRAGLINE BOOM—New. JA-22.

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Small Machines

3 ½ CU. YD.—Plate Front—Will fit 1020 Drag Shovel. New. D-45.

2 ⅝ CU. YD.—Plate Front—Will fit 20-B. New. D-12.

1 2/3 CU. YD.—Plate Front—Will fit New. 14-B. D-13.

2 ¾ CU. YD.—Rock Type—Will fit 20-B. New. D-15.

1 ⅞ CU. YD.—Plate Front—Will fit 1030 or 1035. New. D-18.

1 ⅞ CU. YD.—Ins. Tooth—Will fit 1030. New. D-47.

2 1 CU. YD.—Ins. Tooth—Will fit Types B, B-2, B-3, GA-2 and GA-3. New. D-48.

1 1 CU. YD.—Plate Front—Will fit 20-B. New. D-42.

1 1 CU. YD.—Manganese—Will fit B-2 and GA-2. Good condition. Used. D-40.

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1 1¼ CU. YD—Cast Front—Will fit 30-B, 42-B, E-2. Used. 41-B, D-43.

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1 1¼ CU. YD. — Ins. Tooth — Will fit New. 37-B. D-51.

1 1¼ CU. YD. — Ins. Tooth — Will fit Used. 37-B, D-52.

1 1¼ CU. YD. — Ins. Tooth — Will fit Used. 37-B. D-38.

2 1½ CU. YD.—Ins. Tooth—Will fit 42-B, New. 43-B. D-55.

1 1½ CU. YD.—Ins. Tooth—Will 43-B. Used. D-39.

3 1¾ CU. YD.—Ins. Tooth—Will fit 43-B. New. D-58.

1 ⅝ CU. YD. ROCK—Will fit 20-B. New. D-64.

1 1 CU. YD. PLATE FRONT—Will fit 30-B, 41-B, 42-B, E-2. New. D-65.

1 1 CU. YD. CAST FRONT—Will fit 30-B. New. D-66.

1 1¾ CU. YD. ROCK—Will fit 50-B. New. D-67.

1 2 CU. YD.—Will fit 50-B. New. D-68.

Large Machines

1 2 CU. YD.—Manganese—Will fit 43-B. New. D-62.

2 3 CU. YD.—2½" Molybdenum cast steel front, two part Van Port reversible teeth—Will fit 100-B, 68-C, 70-C. New. D-2.

1 3½ CU. YD.—2¾" nickel chrome steel front, two part Van Port reversible teeth—Will fit 88-C, 95-C, Class 80 Atlantic. New. D-3.

1 4 CU. YD.—2¾" Molybdenum cast steel front, two part reversible teeth. In good condition.—Will fit 100-C, 120-B. Used. D-4.

2 6 CU. YD.—Molybdenum steel front. Annealed cast steel back, two-part Reversible Van Port Teeth.—Will fit 200-B, 225-B and 320-B. New. D-11.

1 8 CU. YD.—Front Molybdenum steel, two part Van Port Reversible teeth. Slightly used but excellent condition.—Will fit 320-B. Used. D-6.

LOCOMOTIVES

3 24-INCH GAUGE 3-TON BALDWIN GASOLINE LOCOMOTIVES, Model AL, Type 2. Price very favorable. L-1.

PUMPS

1 NB—3 STAGE CENTRIFUGAL PUMP—2" suction and discharge — bronze impeller and shaft—capacity 100 gallons per minute at 240' head operating at 1720 RPM or 270' head at 1780 RPM. Now equipped for belt drive but can be operated by 15 HP Electric Motor. ME-6.

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1 1½ CU. YD.—BECO TYPE "X". 4200 lbs. New. DB-22.

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1 5 CU. YD.—MONIGHAN HEAVY DUTY. 12000 lbs. New. DB-16.

1 6 CU. YD.—MONIGHAN TYPE "W". 12500 lbs. New. DB-17.

1 6 CU. YD.—BECO TYPE "X". 14400 lbs. New. DB-29.

1 7 CU. YD.—MONIGHAN TYPE "W". 13700 lbs. New. DB-18.

Clamshell

1 2 CU. YD. TYPE PF WILLIAMS CLAMSHELL BUCKET without teeth and counterweight. CSB-1.

ELECTRICAL EQUIPMENT

90 H.P. MOTOR—GENERAL ELECTRIC—3 phase, 25 cycle, 550 volt, 1500 RPM. NEW. EE-1.

5 KVA TRANSFORMER—GENERAL ELECTRIC—2200-3810 volt primary, 440-220 volt secondary—3 phase, 60 cycle, with cast iron tank and cover, including specially fastened bushings to prevent oil leakage. NEW. EE-4.

125 KW GENERATOR—WESTINGHOUSE—250 volts, 500 amperes, Direct current. 440 RPM. Includes two outboard bearings. NEW. EE-5.

TANKS

Water

5—260 GALLON 41⅞"x21"x6'4". No. 14 BW gauge steel plate. T-1.

2—200 GALLON 36½"x20⅛"x6'3" high. Elliptical—$\frac{1}{16}$" steel plates. T-2.

1—283 GALLON 54⅜"x17⅜"x6'4". $\frac{3}{16}$" Steel plates. T-3.

Oil

15—60 GALLON 11½"x18"x77" Elliptical Blue annealed copper alloy smooth plate. T-4.

6—25 GALLON 47¼" dia. 14" deep—12 Gauge Std. Blue annealed copper alloy steel. T-5.

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5—6 CU. FT.—16" dia. x 4'4" high—200 lb. working pressure A.S.M.E. Std. Tested to 350 lb. cold water test. T-11.

1—14 CU. FT.—21½" dia. x 77" high—200 lb. working pressure. Will pass inspection in Massachusetts and any Canadian Province. T-12.

2 16 CU. FT—22⅝" dia. 77" high—200 lb. working pressure A.S.M.E. Std. T-13.

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Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

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1—45 H.P. NEW, NON-REVERSIBLE ATLAS DIESEL ENGINE—4 cylinder, 6" bore x 8" stroke, 650 R.P.M., 4 cycle, vertical, overhead valves and forced lubrication. DE-5.

3—110 H.P., NEW, NON-REVERSIBLE ATLAS DIESEL ENGINES—6 cylinder, 7" bore x 8½" stroke, 600 R.P.M., 4 cycle, vertical, overhead valves and forced lubrication DE-6.

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1 5"x5" reversible—25.6 H.P. at 400 R.P.M. 100 lb. Pressure. ME-4.

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2 46½"x110"—40 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3. B-9.

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AIR COMPRESSORS

1 BRAND NEW WORTHINGTON—METAL-WELD—2-cylinder 7"x6" Vertical 162 cu. ft. piston displacement, Air Compressor. Fitted with Laidlaw feather valves—Lugs on side for mounting on skids or channels—Shaft extended and equipped with semi-flexible coupling to take 2⅝" drive shaft—Force feed lubrication. Automatic control. Includes 1" High capacity centrifugal circulating pump—"V" belt driven—18"x41" Air Receiver, 100 pounds working pressure. A.S.M.E. Standard. Electric or gasoline power required approximately 30 H.P., approximately 1000 R.P.M.—Compressor Speed approximately 550 R.P.M.—Overall dimensions: Height 45"—length 37½"—width 28". AC-3.

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with with fittings. NEW. AC-1.

1 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Used. Make offer. AC-2.

Detouring Loup River

(Continued from page 563)

● *After the tailrace section has been roughed out to full dimensions, Martin-Day uses a Bucyrus-Erie 1035 dragline to finish the sloping of the canal banks.*

winter on the job. These Nebraska winters, without going too much in detail are not very enjoyable.

Martin-Day Have 3,300,000-Yard Section

The tailrace, final section of the canal, has a wider cross-section than those above. Specifications call for a 42-foot bottom with 1 to 1½ slopes. General method of excavation here is, however, the same as on the upper portions of the project. The Diesel-powered Monighan 6160, equipped with a 140-foot boom and an 8-yard bucket was purchased new for the job and placed in operation in March of 1935. It started digging just south of the Union Pacific railroad tracks, excavated half the width of the ditch for a mile due south, crossed over, headed north, taking out the other half. A short piece of canal, a quarter of a mile long between these tracks and the Lincoln Highway was then removed. A fill was thrown across the ditch to serve as a temporary detour for the highway pending completion of a bridge.

Meanwhile Union Pacific crews were busy with a pile driver building a bridge to carry the tracks across the canal. This work forges steadily ahead while rail traffic is maintained.

Working north of the highway on a sweeping curve to the west, toward where the power house will eventually be erected, the big Monighan chewed out half a mile of ditch on one side, returned to the highway to proceed northward again, completing the full width of the canal.

The tailrace, nearly at the level of the Platte River, must be excavated almost entirely under water. Practically all of the material here is sand, a combination which has slowed up the work considerably.

In charge of the work for Martin Day is Superintendent Les Smith, who has kept the work moving ahead satisfactorily in spite of the difficulties of underwater excavation. Mr. Smith is well pleased with the performance of the big Monighan, and has succeeded in earning estimates well over 200,000 yards per month.

Operating four six-hour shifts per day, the dragline has bailed away for months without many delays other than for routine maintenance. Superintendent Smith, in spite of his pride in the performance of the larger machine, was most enthusiastic about a 5-year old Bucyrus-Erie type 1035 gasoline machine which has worked on Martin-Day contracts steadily all over the state, and still perks along like a youngster. Handled by operator Lester Utman, this dragline does the finishing of the ditch slopes. So accurate is he on this work that his one-man crew for hand finishing can take it easy much of the time. No record is kept of the yardage handled by this machine, but we did notice nine buckets of sand placed in two minutes and suspect that during each eight-hour shift it handles better than 2,000 cubic yards. At first this veteran was operated two six-hour shifts, but Superintendent Smith couldn't find two operators who sloped alike, and one man like Les Utman was plenty to handle all the sloping anyway.

Project Alleviates Unemployment

Major features of the Loup River Public Power Project which have not as yet been started are the dam across the Loup River near Fullerton, the power house tentatively projected to generate 40,000 kilowatts of power, and the weir at the exit from the tail race. Some thought has also been given to an additional storage reservoir near Monroe, which may be built to irrigate farm land in that area. The entire project is scheduled for completion in January, 1938, though present progress indicates excavation will be completed several months before that date. In the meantime more than 300 men have steady employment, and a worthwhile project is coming into being, a works which will benefit the country for generations to come.

Signs of Prosperity!

Street cleaners report cigar stubs are not nearly so short.

Spare tires are beginning to appear on tire racks.

It is safer to leave children's banks around the house.

People are saying: "Won't you stay to dinner?"—as if they meant it.

Men are getting haircuts almost regularly.

Women report a gradual improvement in the quality of bridge prizes, and nobody has won a Woolworth lamp shade in several weeks.

Let's roll up our sleeves and go to it. About the only thing that can "lay down" on the job and get results is the hen.

Field Notes

(Continued from page 566)

recover, but cutting an award of damages from $22,800 down to $16,000, the Supreme Court decided that the statute was constitutional and applicable to this case (Tillson v. Consumers' Power Co., 256 N. W. 801). We quote the principal passages of the court's lengthy opinion:

"Was the owner exempt from liability by reason of the excavating having been done by the Bartling & Dull Company as an independent contractor? That the excavation specified for the Consumers' Power Company's building necessitated operations which seriously jeopardized the safety of plaintiff's building is too clear for argument. The foundation under plaintiff's south wall was known to be of cobblestone construction and not of great depth below the surface. Before work was started, borings had disclosed the nature of the soil; and, as the work progressed, other borings were taken and the extra hazardous condition became fully apparent. There was an obvious danger of an unusual character. Under our decisions, each of the defendants is liable for the resultant damage to plaintiff's property, if the subcontractor is liable. . . .

"Defendants other than Bartling & Dull Company cannot escape liability on the theory that the latter, in operating on plaintiff's property or in permitting soil and water to escape from plaintiff's property, became a trespasser, and that his doings in these particulars were not within the scope of his contract. The record discloses that the subcontractor did nothing more or different than was clearly within the scope of executing his part of the contract for the construction of the Consumers' Power Company's building. Further, under the terms of the building contract, the architect employed by the Consumers' Power Company had the power of general supervision. . . . The record does not disclose such a departure from the proper execution of the subcontractor's undertaking as relieves either of the other defendants of joint liability."

Since the excavating contractor in this case did his work within the terms of his contract, it seems that there were only two ways whereby he could have protected himself against what happened. One way would have been to have insisted upon an agreement by the general contractor or owner to indemnify him against any liability to the adjacent owner for results of work done according to contract. The other would have been to have taken such engineering measures as would have insured adequate support for the adjacent premises.

—Arthur L. H. Street,
Attorney-at-Law.

Draftsman Wanted

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OPERATOR

Operator with seven years' experience desires work on any type machine. Has operated draglines 4 years, shovel 2 years and crane-clamshell 1 year. Experienced on steam, electric, gas, Diesel and gas-air machines in sand and gravel pit, stripping, levee building and lock and dam construction. Can furnish excellent references. Willing to go anywhere. Age 28; married. Now located 70 miles southwest Chicago, Illinois. Box 7701.

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Twelve years' experience on steam shovels, clamshells and locomotive cranes—excavating, pile driving, steel erection work. Can do own repairing. Age 30 and single. A-1 references. Present location, New York. Box 7603.

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16 years' experience as shovel operator. Married, 36 years of age. Have operated practically all makes of machines, and have 10 years' experience as dragline operator. Can handle steam, Diesel, electric or gasoline machine. Have worked on highway and railroad grading, rock excavation in quarry, drainage and irrigation and dredging and also gold dredging. Prefer position on Bucyrus-Erie E-2, D-2, or 50-B or other Bucyrus-Erie machines. Have also operated Class 220 and 225 electric and Diesel electric machines. Capable of taking charge of repairing and erecting and can handle crews. Best of references and can do own repairing. At present located in California, but will go anywhere. Box 5507.

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Have 14 years' experience as foreman and superintendent of quarries. Age 34. Will take stock in company as part of monthly salary. Married. Willing to go anywhere. Box 7601.

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OPERATOR

Experienced operator desires shovel or dragline work. Has had fourteen years' experience on shovel, dragline and clamshell in quarry, coal stripping and loading, and contracting. Prefers Bucyrus or Marion—½ to 6 yards—steam, electric or gas. Can do own repair work. Can furnish best of references. Age 39; married. Willing to go anywhere. Now located in Kansas City, Mo. Box 7702.

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Five years' experience on Bucyrus-Erie Gas+Air on basement excavation, highway and street grading. Also eight years experience on Erie, Marion, Bucyrus steam shovels. Will go anywhere. Can do own repairing. A-1 reference. Sober and reliable. Present location Minnesota. Box 7501.

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BUCYRUS-ERIE LATE MODEL B-2 STEAM HIGH LIFT SHOVEL. 1 yard dipper—single shaft cat mounting. Good condition. Located near St. Louis. Box 518-SS.

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION ONE YARD SHOVEL AND 45' BOOM CLAMSHELL AND DRAGLINE not including Buckets Recently reconditioned. Located Indianapolis. Box 766-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL—Caterpillar mounted. Good operating condition. Massachusetts Boiler. Located New York. Box 753-SS.

BUCYRUS-ERIE—GA-2 GAS-AIR SHOVEL. Extra High Lift. Caterpillar mounted. Good operating condition Waukesha 5¾"x8" four cylinder gasoline Engine. Air Starter. Located Chicago. Box 754-SS.

1 BUCYRUS-ERIE B-2 Steam ⅞ yard High Lift Shovel—Cat Mounted. Good operating condition. Located near Boston. Make offer. Box 521-SS.

BUCYRUS-ERIE GA-2 Gas-Air High Lift Shovel. 24' Boom, 18'4" Dipper Handle, 1 cubic yard Dipper. Single shaft cat. Waukesha four cylinder gasoline engine. Excellent operating condition. Located North of Chicago. Box 645-SS.

BUCYRUS-ERIE B-2 Steam Combination Shovel and Clamshell Machine. Single shaft cat mounted. ¾ cubic yard Williams Clamshell Bucket included. Excellent mechanical condition. Located Virginia. Box 672-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. 19'9" Boom, 16' Dipper Handle, ⅞ cubic yard inserted tooth Dipper. Two speed propelling gear. Located Boston. Box 716-SS.

BUCYRUS-ERIE B-2 EXTRA HIGH LIFT STEAM SHOVEL. 21'3" Boom, 16' Dipper Handle, ⅞ cubic yard inserted tooth Dipper. Single Shaft Cat. Located Boston. Box 717-SS.

BUCYRUS-ERIE GA-2 COMBINATION SHOVEL AND DRAGLINE. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. 50' Dragline Boom including Fair leads but not Bucket. Air Starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE GA-2 HIGH LIFT SHOVEL. 24' Boom—18'4" Dipper Handle, 1 cubic yard Inserted Tooth Dipper. Also includes Forward Drum and Gearing and mechanism for clamshell operation including 45' boom. Also 1 cubic yard Williams clamshell bucket. Waukesha WL Engine. Good operating condition. Located Chicago. Box 702-SS.

BUCYRUS-ERIE B-2 STEAM SHOVEL, Cat Mounted. 19'9" boom, 16' dipper handle, 1 cubic yard dipper. Good running condition. Located, Minnesota. Box 621-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Very good working condition. Located South Carolina. Box 644-SS.

BUCYRUS-ERIE MODEL B-2 High Lift Steam Shovel. Caterpillar mounted. Good working condition. Located northern New Jersey. Price very reasonable. Box 643-SS.

BUCYRUS-ERIE GA-2—Gas-Air Combination High Lift Shovel and 50' Boom Dragline Equipment, mounted on Single Shaft Cat. Good operating condition. Located at Shawnee, Okla. 537-SS.

B-2 EXTRA HIGH LIFT STEAM SHOVEL. 24' Boom—18'4" Dipper Handle—⅝ yard Inserted Tooth Dipper—Boom Hoist—Caterpillar Mounted—Good operating condition. Located Chicago. Box 700-SS.

LORAIN—MODEL 60—One cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 677-SS.

FOR SALE CHEAP

Marion Model 440 Gas Shovel and Dragline, 1 cubic yard capacity. For sale cheap. Located Missouri. Box 634-SS

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

MARION 1 YARD STEAM SHOVEL Box 575-SS.

NORTHWEST MODEL 105—1 YARD GASOLINE SHOVEL. Fair running order. Located Georgia. Bargain price. Box 579-SS.

NORTHWEST NO. 4—24' Boom, 16' Dipper Handle, 1 yard Dipper Gasoline Located eastern New York. Good condition. Box 600-SS.

P & H MODEL 600—1 yd. Gasoline Shovel— including 40' boom dragline equipment without bucket. Waukesha Engine. Recently overhauled. Located in Alabama. Box 483-SS.

P&H MODEL 600—1¼ CUBIC YARD GASOLINE SHOVEL. Will be put in good operating condition. Located eastern Pennsylvania. Box 664-SS.

P&H—MODEL 600—Combination 1 yard shovel and 40' boom dragline including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Georgia. Box 695-SS.

1¼-YARD

BUCYRUS-ERIE — FACTORY REBUILT — 1¼ YARD GASOLINE ROPE CROWD SHOVEL. Wisconsin D-3 6-cylinder 5½"x6½" gasoline engine. Kohler 1½-KW light plant installed. Extremely low price. Dragline equipment available. Factory guarantee. Available December 1 to 15. Box 736-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL: 21' boom, 15' dipper handle, boom hoist, dipper trip, 1¼ cu. yd. Vanderhoef dipper, cat mounting, now located and can be demonstrated at Colchester, Conn. Very favorable price. Box No. 532-SS.

BUCYRUS-ERIE GA-2 Gas-Air Extra High Lift Shovel—24' Boom, 18'4" Dipper Handle, 1¼ cu. yd. Dipper, Single Shaft Cat. Electric Starter. Excellent condition. Located eastern Pennsylvania. 592-SS.

BUCYRUS-ERIE GA-2 HIGH LIFT SHOVEL— 24' boom, 16' dipper handle, 1¼ cubic yard dipper, on single shaft cat. Electric starter, Waukesha 4-cylinder 6¼"x8" gasoline engine. Reported excellent condition. Located Virginia. Box 623-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL—21' Boom, 15' Dipper Handle, 1¼ cu. yd. Dipper, Power Boom Hoist, Cat mounted. Located New York City. Box 545-SS.

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION SHOVEL AND DRAGLINE. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SS.

BUCYRUS-ERIE GAS-AIR TYPE GA-2 HIGH LIFT SHOVEL — 22'6" boom — 16' dipper handle—1¼ yard cast front inserted tooth dipper—single shaft caterpillar mounting—electric starter. Excellent condition. Field reconditioned. Waukesha 4-cylinder 6¼'x8" engine — New cylinder blocks and piston rings. Located near Scranton, Pennsylvania. Will demonstrate. Box 508-SS.

BUCYRUS ERIE GA-2 Gas-Air High Lift Shovel—24' Boom, 16' Dipper Handle, 1¼ cu. yd. Dipper, Single Shaft Cat, Electric Starter. Waukesha 4-cylinder 6¼"x8" Gasoline Engine. Reported excellent condition. Located West Virginia. 593-SS.

BUCYRUS-ERIE GAS+AIR—22' Boom, 16' Dipper Handle, 1¼ cubic yard Dipper, Waukesha 6¼"x8" four cylinder gasoline engine. Single Shaft Cat mounted. First class condition. Located eastern New York. Box 601-SS.

BUCYRUS-ERIE 41-B STEAM SHOVEL. 21' Boom, 15' Dipper Handle, 1¼ cubic yard Dipper. First class operating condition. Located New York. Box 719-SS.

BYERS MASTER SHOVEL — 26' Boom, 17' Dipper Handle, 1¼ cu. yd. Dipper, New January 1931. Good working condition. Located Melvern, Kansas — Highway 75 south of Topeka. Price very favorable. 591-SS.

LIMA MODEL 101—Combination 1¼ yard shovel and 40' plus 10' extension Dragline—powered with gasoline engine Model JK 6½" x7"—4 cylinder. Shovel equipment practically new. Located Colorado. Box 599-SS.

LIMA 101 GASOLINE 1¼ YARD SHOVEL. Located eastern Pennsylvania. Good operating condition. Price reasonable. Box 576-SS.

LINK-BELT MODEL K-42 1¼ YARD GASOLINE SHOVEL. Waukesha Model WL 6¼"x 8" 4-cylinder Engine—new blocks and pistons this year. Good working condition. Located Colorado. Box 738-SS.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wisconsin

LORAIN MODEL 75 1¼ YARD GASOLINE SHOVEL. Waukesha Engine. Good working condition. Located eastern Pennsylvania. Box 734-SS.

LORAIN—75-A—One and one-quarter cubic yard Gasoline Shovel. Good condition. Located Chicago. Box 676-SS.

LORAIN MODEL 75 GASOLINE COMBINATION SHOVEL AND DRAGLINE. 1¼ cubic yard Shovel Dipper and 1¼ cubic yard Dragline Bucket included. New in 1929. Good working condition. Located near Denver, Colorado.

Ray Corson Machinery Company
1646 Wazee Street
Denver, Colorado

THEW LORAIN MODEL 75 SHOVEL. 24' Boom, 18' dipper handle, 1¼ cubic yard dipper. Gasoline. Machine now operating. Located central New York State. Box 665-SS.

MARION MODEL 450—1¼ Cu. Yd. Steam Shovel, Cat Mounted. New Gears on Caterpillar recently installed. Price favorable. 536-SS.

MARION TYPE 32 STEAMER. Shop No. 5676, 18' boom, 15' dipper handle, 1¼-cu. yd. dipper shipped May, 1926, good operating condition. Box 451-SS.

NORTHWEST MODEL 105 SHOVEL. Bargain Price. Located Texas. Box No. 566-SS.

1½-YARD

BUCYRUS-ERIE 37-B GASOLINE 1½ YARD CHAIN CROWD SHOVEL. Electric Starter. Excellent condition. Used only eight months. Located Connecticut. Box 732-SS.

BUCYRUS-ERIE 35-B ELECTRIC 24' BOOM, 16' Dipper Handle, 1½ cu. yd. Dipper, 3 phase, 25 cycle, 440 volt, Cat mounted. Box 544-SS.

BUCYRUS-ERIE 42-B STEAM SHOVEL—late model, 21' boom, 15' dipper handle, 1½ cu. yd. Vanderhoef dipper, boom hoist, dipper trip. Massachusetts standard boiler, cat mounting. Good operating condition. Now located and can be demonstrated at Colchester, Conn. Box No. 533-SS.

BUCYRUS-ERIE 43-B GASOLINE CHAIN CROWD SHOVEL — 23' boom — 17' dipper handle—1½ cubic yard Vanderhoef dipper and teeth—electric starter—standard single shaft cat. Operated less than six months. Excellent appearance and condition. Will be demonstrated by owner. Located vicinity New York. No. 512-SS.

BUCYRUS-ERIE — FACTORY REBUILT — 1½ YARD CHAIN CROWD SHOVEL. Wisconsin D-3 6-cylinder 5½"x6½" Gasoline Engine. Kohler 1½-KW Light Plant installed. Low price. Dragline equipment also available. Box 737-SS.

BUCYRUS-ERIE—42-B Steam Shovel. Caterpillar Mounted, 21' Boom, 15' Dipper Handle, 1½ Cubic Yard Dipper, Power Boom Hoist. This machine excellent mechanical condition. Located Birmingham, Alabama. Can be demonstrated. Box 531-SS.

KOEHRING MODEL 601 SHOVEL. Cat mounted. 24' boom, 18' dipper handle, 1½ cubic yard manganese front dipper. 20" Cat treads. Wisconsin 6-cylinder Model E, 6"x7" gasoline engine. Located Maryland. Box 631-SS.

LORAIN 75-B COMBINATION SHOVEL AND DRAGLINE. 1¼ cubic yard Shovel Equipment. 50' Dragline Boom, without bucket. Waukesha 6¾"x8" four cylinder gasoline engine. Excellent condition. Located eastern Pennsylvania. Box 720-SS.

TWO LORAIN 75-B COMBINATION 1½ CUBIC YARD SHOVEL AND 50' BOOM DRAGLINES — without buckets. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SS.

LORAIN 75-B 1½ CUBIC YARD SHOVEL. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 722-SS.

OSGOOD "VICTOR" 1½ CUBIC YARD SHOVEL AND 50' BOOM CLAMSHELL MACHINE. Gasoline Power. Good operating condition. Located Wisconsin. Box 760-SS.

P&H MODEL 700—1½ cubic yard shovel. Powered with Waukesha 150 h.p. Ricardo head 7½"x8" gasoline engine. Good operating condition. Located New Mexico. Box 652-SS.

1¾-YARD

BUCYRUS-ERIE 43-B GAS SHOVEL—22' boom, 16' dipper handle, 1¾ yard inserted-tooth dipper. Electric starter, Wisconsin 6 cylinder 6x7" engine. Reconditioned—first class condition. Located New York. Box 617-SS.

Small Draglines
Under 2 Yards

½-YARD

P & H MODEL 206 GASOLINE DRAGLINE— 38' boom. Waukesha engine. Located Eastern Pennsylvania. Fair condition. Bargain price. Box 711-SD.

¾-YARD

BUCYRUS-ERIE 20-B COMBINATION STEAM DRAGLINE - CLAMSHELL - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SD.

KOEHRING MODEL 301 COMBINATION 40' BOOM DRAGLINE & SHOVEL, caterpillar mounted. Gasoline Power. Good operating condition. Located Indiana. Box 764-SD.

1-YARD

BUCYRUS-ERIE 30-B DIESEL DRAGLINE. 40' Boom. 1 cubic yard Page S Drag Bucket. Good operating condition. Located southern Illinois. Box 756-SD.

BUCYRUS-ERIE GA-2 COMBINATION DRAGLINE AND SHOVEL. 50' Dragline Boom including Fairlead but not Bucket. 22'6" Shovel Boom, 16' Dipper Handle, 1 cubic yard cast front inserted tooth Dipper. Air Starter. Good condition. Located Newark. Box 718-SD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Draglines
Under 2 Yards
Continued

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION 45' BOOM DRAGLINE AND CLAMSHELL AND ONE YARD SHOVEL. Buckets not included. Recently reconditioned. Located Indianapolis. Box 766-SD.

LINK-BELT 1 CUBIC YARD CAPACITY 50' BOOM DRAGLINE WITHOUT BUCKET. Gasoline power. Reported good operating condition. Located near Chicago. Box 724-SD.

P&H—MODEL 600—Combination 40' boom dragline and 1 yard shovel including dragline bucket. Waukesha gasoline engine. Machine in fair operating condition. Located Georgi- Box 695-SD.

1¼-YARD

BUCYRUS-ERIE — DIESEL-AIR — COMBINATION DRAGLINE AND SHOVEL. 22'6" Boom—16' Dipper Handle—1¼ cubic yard Inserted Tooth Dipper. 45' Boom—Complete Dragline Equipment without bucket. Engine—Atlas Diesel. Located Oklahoma. Good operating condition. Box 703-SD.

OSGOOD GASOLINE MODEL NO. 4 50-FOOT BOOM 1¼ YARD DRAGLINE including Bucket. Engine Wisconsin D-4 6-cylinder. Excellent condition. Located central Pennsylvania. Box 733-SD.

1½-YARD

BUCYRUS-ERIE—FACTORY REBUILT—37-B 40' BOOM DRAGLINE. Wisconsin D-3 6-cylinder 5½"x6½" Gasoline Engine. Kohler 1½-KW Electric Light Plant installed. New machine guarantee. Available December 1 to 15. Either 1½ yard chain crowd or 1¼ yard rope crowd shovel equipment available. Box No. 736-SD.

LINK-BELT MODEL K-44 45' BOOM PLUS TWO 10' AND ONE 5' EXTENSIONS—TOTAL 70' DRAGLINE WITHOUT BUCKET. Gasoline power. Includes 800 Watt Kohler Light Plant. Located near Chicago. Good operating condition. Box 723-SD.

2 LORAIN 75-B COMBINATION DRAGLINES AND SHOVELS. 50' dragline booms without buckets. 1½ cubic yard shovel equipment. Gasoline power. Good working condition. Located eastern Pennsylvania. Box 721-SD.

LORAIN 75-B COMBINATION DRAGLINE AND SHOVEL. 50' Dragline Boom without Bucket. 1¼ cubic yard Shovel Equipment. Waukesha 6¾x8" four cylinder gasoline engine. Excellent condition. Located eastern Pennsylvania. Box 720-SD.

TWO P&H 700 DRAGLINES. 1½ cu. yd. buckets on 50' booms. Gas and Diesel. Located Lower Rio Grande Valley, Texas. Box 618-SD.

1¾-YARD

BUCYRUS-ERIE — 43-B GASOLINE — COMBINATION DRAGLINE AND CLAMSHELL— 1¾ cubic yard Bucket capacity—no bucket. Good condition. Located Arizona. Box 704-SD.

2-YARD

BUCYRUS-ERIE 46-B DRAGLINE. 65' Boom with 10' removable insert. 1¾ cubic yard Omaha and 2 cubic yard U drag buckets included. Engine LeRoi RXS 6 cylinder 6½"x 7" gasoline. Kohler 1½ KW Light Plant installed. Excellent mechanical condition. Located Indiana. Box 755-SD.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wis.

Small Clamshells and Cranes
Under 2 Yards

⅜-YARD

BAY CITY "PUP" CLAMSHELL MACHINE. Good operating condition. Box 514-SCC.

½-YARD

BYERS BEARCAT 25' BOOM CLAMSHELL (¾ swing) and ½ cu. yd. Clamshell Bucket, including Trench digging attachment carrying ½ cu. yd. dipper. 24" wide over cutters—will dig maximum 15'. Good operating condition. Very attractively priced. Located vicinity of Wilkes Barre, Pennsylvania. Box 494-SCC.

BYERS BEARCAT CLAMSHELL—Crane—30' boom. Will handle ½ cubic yard bucket. Located near Grand Rapids, Mich. Box 648-SCC.

ORTON 24' BOOM—½ CUBIC YARD CLAMSHELL MACHINE. ½ cubic yard Owen Clamshell Bucket. Hercules 55 HP. Gasoline Engine. Factory rebuilt 1932. Good operating condition. Located Tennessee. Box 709-SCC.

UNIVERSAL—MODEL NO. 35—28' boom clamshell and ½ cu. yd. shovel including ½ cu. yd. Owens clamshell bucket. Powered by Waukesha four cylinder 4½" x 6¼" gasoline engine. Engine completely overhauled this year. Entire machine put in first class shape. Excellent condition. Located North Carolina. Box 696-SCC.

¾-YARD

BUCYRUS-ERIE 20-B COMBINATION STEAM CLAMSHELL - DRAGLINE - SHOVEL. Good working condition. Caterpillar Mounted. Located near Peoria, Illinois. Box 701-SCC.

BUCYRUS-ERIE 1030 GASOLINE 40' BOOM CLAMSHELL MACHINE. Cat mounted. No Bucket. Recently overhauled. Guaranteed. Located Kansas City. Box 543-SCC.

O & S MODEL "T" ¾ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located near St. Louis. Good working condition. Box 651-SCC.

⅞-YARD

MARION TYPE 7 CRANE AND STEAM SHOVEL. Crawler mounted. Equipped with extra drum for clamshell work but does not have crane boom or clamshell bucket. 20' Shovel Boom, 15' Dipper Handle, ⅞ cubic yard Dipper. Excellent operating condition. Located near Baltimore, Maryland. Box 759-SCC.

1-YARD

BUCYRUS-ERIE GA-2 45' BOOM CLAMSHELL MACHINE. Single Shaft Cat. Waukesha 5¾"x8" four cylinder gasoline Engine. Good operating condition. Located St. Paul, Minnesota. Box 761-SCC.

BUCYRUS-ERIE GA-2 GAS-AIR COMBINATION 45' BOOM CLAMSHELL AND DRAGLINE AND ONE YARD SHOVEL. Buckets not included. Recently reconditioned. Located Indianapolis. Box 766-SCC.

INDUSTRIAL BROWN HOIST — 50' Boom, Caterpillar Mounted, Gasoline Crane. Lifting capacity 30,000 pounds at 12' radius. Good operating condition. Located Minnesota. Box 765-SCC.

1¼-YARD

P&H MODEL 700—50' BOOM CLAMSHELL MACHINE INCLUDING 1¼ CUBIC YARD OWEN CLAMSHELL BUCKET. Waukesha 6¼"x8" four cylinder gasoline Engine. Excellent condition. Located Chicago. Box 762-SCC.

NORTHWEST MODEL 105 Gasoline—40' boom clamshell. Good operating condition. Located Iowa. Box 516-SCC.

1½-YARD

OSGOOD "VICTOR" 50' BOOM CLAMSHELL MACHINE AND 1½ CUBIC YARD SHOVEL. Gasoline Power. Good operating condition. Located Wisconsin. Box 760-SCC.

1¾-YARD

BUCYRUS-ERIE — 43B GASOLINE — COMBINATION CLAMSHELL AND DRAGLINE— 1¾ cubic yard Bucket capacity—no bucket. Good condition. Located Arizona. Box 704-SCC.

Large Shovels and Draglines
2 Yards and Over

1½-W MONIGHAN WALKER. Diesel power. 2 yard capacity. 60-foot boom Good condition Reasonably priced. Located Kansas. Box 742-LSD.

2-W MONIGHAN WALKER 3½ yard capacity. 70-foot boom. Good condition. Reasonably priced. Located Kansas. Box 743-LSD.

50-B STEAM SHOVEL, Number 3946; equipped with 1½-cubic-yard dipper, 26-foot boom, also 1½-cubic-yard dragline bucket with 50-foot boom caterpillar mounted, equipped for burning oil, located at Texarkana, Ark. Price $3,000. Box 112-LSD.

FOR SALE

CLASS 14 STEAM DRAGLINE with 2-yard Page bucket. Location Iowa. Very good condition. Surprisingly low price f.o.b. cars

ALSO

2-YARD MONIGHAN STEAM DRAGLINE in fair condition—cheap. Box 419-LSD.

CLASS 320 STEAM DRAGLINE. 144-foot boom. 8-yard bucket. Located on Illinois River. A good buy. Box 750-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 751-LSD.

If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wis.

TYPE 175-B ELECTRIC, No. 794 equipped with 87' shovel boom, 48' dipper handle, 3½-yd. bucket, and dragline equipment including 125' boom, and 3½-yd. bucket. This machine was recently reconditioned and is in good operating condition. Present, location, Connecticut. Box 263-LSD.

100-B STEAM SHOVEL, 3 yd. dipper, location Eastern Canada. Immediately available. Used—good condition. Box 669-LSD.

MONIGHAN DRAGLINE MODEL T, 2-cubic-yard 60-foot boom located near Wichita, Kansas. About seven years old. Has recently been thoroughly overhauled. Box 180-LSD.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

SACRIFICE PRICES
2—50-B Bucyrus-Erie Diesel Draglines with 50′ Booms, Light Plants, Buckets, Used Approximately Eight Months on Light Work, Shop Nos. 10218 and 10219.
1—Back Hoe Attachment for 50-B.
Located in this district.
R. C. STANHOPE, INC.
101 W. 31 St. New York, N. Y.

TWO 3-W MONIGHAN WALKERS. 3½ yards. 70- and 77-foot booms. Good condition. Reasonably priced. Located Louisiana.
Box 745-LSD.

BUCYRUS 320-B STEAM STRIPPING SHOVEL, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

2-W MONIGHAN WALKER. 2½ yard capacity. 70-foot boom. Good condition. Priced reasonably. Located Louisiana. Box 744-LSD.

FOR SALE OR RENT
TWO CLASS 14 STEAM DRAGLINES, caterpillar mounted, equipped for burning gas or oil. Located, Southwest. Price approximately $4,000 each.
Box 619-LSD.

50-B STEAM DRAGLINE. 1½-yard bucket. 60-foot boom. Located in Alabama.
Box 747-LSD.

50-B STEAM SHOVEL. 2-yard capacity. Recently used near St. Louis. Good condition.
Box 748-LSD.

CLASS 14 DIESEL-ELECTRIC DRAGLINE. 70-foot boom. 2-yard bucket. Immediately available. Located near St. Louis. Box 749-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory.
Box 347-LSD.

75-B BUCYRUS-ERIE ELECTRIC QUARRY SHOVEL. 2½ cu. yd. capacity. Also dragline equipment. Located on west coast. Just the machine for medium size quarry.
Box 746-LSD.

68-C BUCYRUS ELECTRICALLY OPERATED SHOVEL, equipped with 2½-yard manganese front dipper, 3 phase, 60-cycle, 440-volt motors, transformers, cable, reel and approximately 1400 feet of cable all in excellent condition. Reasonable price.
Address Box 268-LSD.

MARION MODEL 350 W. L. SHOVEL. New 1923. 90′ boom, 56′ handle, 6 yd. dipper, 3 phase, 60 cycle, 2300 volts, series motors. Has handled about 1,000,000 yds. stripping. Good condition Price approximately $50,000.00 f.o.b. cars, Iron Range. Box 656-LSD.

Locomotive Cranes

TWO AMERICAN STEAM LOCOMOTIVE CRANES. Each 8 wheel—25 ton capacity. Each equipped with 8¼"x10" double cylinder engine. Boom 50′. Steam brakes and train air line. Boiler 54"x101" ASME—130 pounds pressure. Standard gauge 4′x8½". Used only eight months. Splendid condition. Box 628-ME.

BROWNING — 8 wheel Locomotive Clamshell Crane — 45′ Boom — 1 cubic yard Clamshell Bucket. Steam power. Good condition. 15 ton capacity. Located Chicago. Will sell cheap.
Box 678-ME.

Locomotives

LOCOMOTIVES
3 BALDWIN, 17x24, straight drive standard gauge 45 ton locomotives. 54 inch boilers. Shop numbers from 32,750 to 34,611. Each one has passed State Boiler Inspection yearly. Boilers will stand cold water test of 240 lbs. At present in actual service in Minnesota mine. Box 152-ME.

For Sale or Rent
Two 40-ton, 6-wheel switchers. Recently overhauled and rebuilt. Two 50-ton 6-wheel switchers. In excellent condition. Location Chicago. Box 306-ME.

If You Do Not Find What You Want Listed—Write Us
Excavating Engineer
South Milwaukee, Wisconsin

Miscellaneous Equipment

LOADMASTER—MODEL MD—Wheel type, 16′ boom, starter, lights, and Ross steering gear. In service loading freight cars for 17 months. New August 1, 1933. Completely rebuilt with new engine parts, new tires, hoist clutches, etc. Guaranteed like new. Reasonably priced f. o. b. Chicago. Box 684-ME.

BRAND NEW PAGE DRAG SHOVEL EQUIPMENT suitable for application to Bucyrus-Erie 1030, 1035, or 32-B machines now in the field, consisting of 17′1½" boom, 11′ dipper handle, and two ¾ cubic yard dippers; one 38" wide over cutters—the other 49½" wide over cutters, together with auxiliary A frame and ropes. Priced below cost. Box 683-ME.

4—75 DIESEL CATERPILLAR TRACTORS.
4—EUCLID DUMP WAGONS. Located eastern Pennsylvania. Box 710-ME.

The Bargain of the Year

ONE COMPLETE NARROW GAUGE DIRT MOVING OUTFIT including camps, shop and haulage equipment. Located near Fort Wayne, Indiana. Can you use it?

54 Steel bunks with mattresses and bedding. Mattresses and bedding are sewed up in burlap.
6 Heating stoves.
50 Shovels and picks, approximate.
1 Fairbanks Morse gasoline engine and 5x5 bulldozer pump 3 HP.
2 Fairbanks Morse gasoline engine and 3x5 bulldozer pump 1½ HP.
4 Track jacks, 15 ton.
3 Track jacks, light.
1 Duplex Pump—Worthington, 5½x3½x5.
10 Slips.
1 Anvil.
1 Forge.
6 Switches.
4 Frogs.
10 Switch points.
2 Each, scythes, hand saws, cant hooks, spike malls.
1 Carbide light.
1 Kitchen outfit.
30 Western dump cars, 5-yard.
1 36x84" vertical boiler.
1 6" centrifugal pump with upright engine attached.
2 Galvanized water tanks, wagon size.

Will consider individual sale of separate items.

Address Box 449 ME.

COMPLETE CONTRACTORS EQUIPMENT
Offered for sale by Southern contractor. Priced to sell.
7—Railroad Type Steam Shovels 2½ to 5 yd.
3—Full Revolving Shovels, ¾ yd.
1—Gasoline Clamshell Crane, ½ yd.
2—Jordan Spreaders.
2—Locomotives, 26 Ton, American Saddle Tank.
32—12-yd. Western Heavy Duty Dump Cars.
1—Flat Car.
3—Camp Cars.
2—1-bag Gasoline Concrete Mixers.
Pumps, Boilers, Jacks and Other Tools.
For further particulars, Address Box 138-ME.

SHOVEL FRONT ENDS
ONE COMPLETE 52-B DIESEL SHOVEL FRONT END. Consists of boom, dipper handle and 2¼ cu. yd. dipper.
TWO COMPLETE 52-B ELECTRIC SHOVEL FRONT ENDS. Consist of Booms, dipper handles and 2¼ cu. yd. dippers. Motors on booms are 3-phase, 60 cycle, 2300 volt current.
Box 741-ME.

ONE (1) PARSONS No. 40 TRENCHING MACHINE, 18′ ladder with buckets for from 18 to 42" trench. In good mechanical condition. Located in St. Louis, Missouri. Price $5000.00 F.O.B. cars.
Box 740-ME.

1—JEFFRY, TRAYLOR VIBRATING SCREEN, double deck size, 48x78, Model FB4 In perfect condition. For sale at a bargain.
Gordon Construction Co.
1900-31st St., Denver, Col.

PARTS—175-B Shovel—PARTS
1 Main Engine
1 Boom
1 Dipper Shaft
1 Crowding Engine
1 Five Yard Dipper
If interested in making a good buy on these shovel parts, write us.
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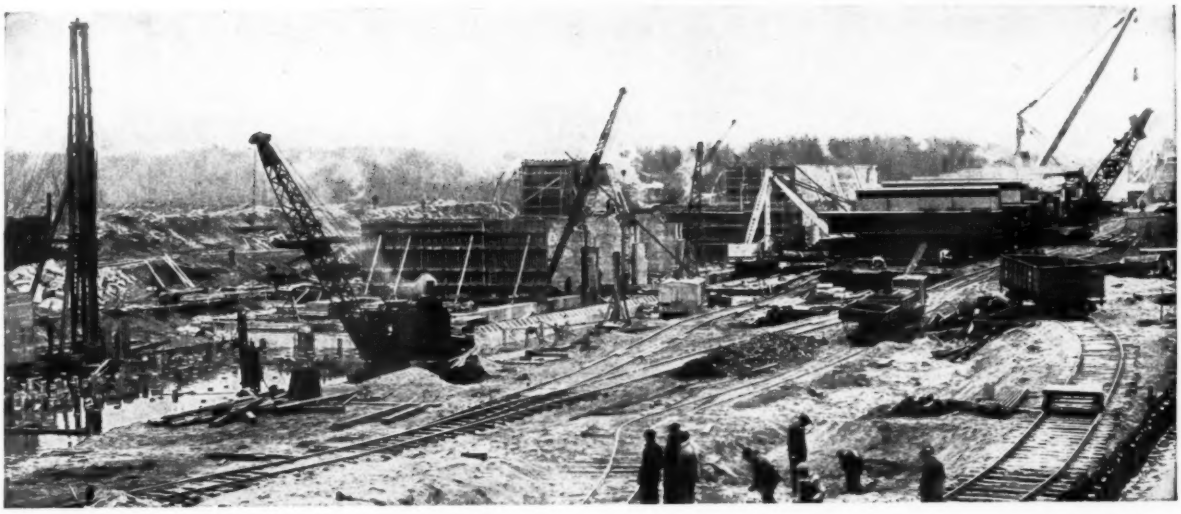

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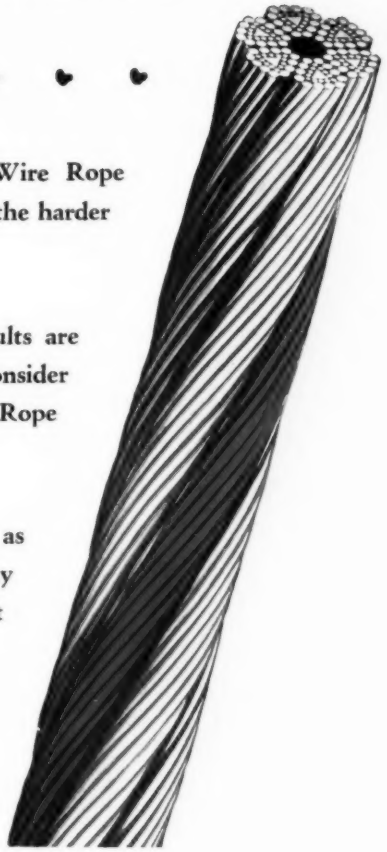

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